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Financial sustainability of microfinance institutions (MFIs): an empirical analysis

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ABSTRACT

This study examines the determinants of financial self-sufficiency among 687 microfinance institutions (MFIs) in 63 countries worldwide. By adopting an empirical approach the paper attempts to answer one question: which are the factors that influence the sustainability of a microfinance institution (MFI)?

During the study the notion of sustainability is carefully analysed and the concept of financial sustainability is used to consider the possibilities of an institution to be self-sufficient in the long term without the help of grants and donations.

Results find that there are several variables which are statistically significant and together they influence the long term financial self-sufficiency of an institution. The capital structure is found to be an important determinant of the institution success and sustainability together with the positive influence of the collection of deposits from clients. Moreover macroeconomic variables such as inflation and lending rate are also found to have an effect on the MFI self-sufficiency.

Other factors affecting MFI sustainability are a low portfolio at risk, a low percentage of non-earning liquid assets and the yield on gross portfolio suggesting that high interest rates on loans contribute to the institution sustainability. Geographically speaking, South East Asian MFIs result to perform significantly better than other institutions located and operating in other parts of the world.

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1. INTRODUCTION

The 20th century has been characterized by many new products and discoveries in the financial sector industry. Capitalism has allowed the proliferation of many new ideas in this area.

Microfinance is only one of them. The target of clients that microfinance serves represents the difference with many of other discoveries. Whilst most of the new ideas target the smaller and richest part of the world population, microfinance reaches a large number of poorer people enabling them to access to financial services such as credit and deposits, simple financial services taking for granted in developed countries. The access to financial services has to be considered formal as there are many informal ways in which people tend to borrow for credit and save money for unexpected situations.

Microfinance has been accepted not only as a financial mean to target specific people but it comprehends also a social aspect contributing to poverty reduction, women empowerment, economic development and employment creation.

Microfinance allows a sustainable form of financing for the most needed and it helps to reduce inequalities in the world. In 2008 Bill Gates held a speech at the World Economic Forum in Davos (Switzerland) regarding the importance of what he called "Creative Capitalism", an ideology that points out the creation of a profit and the reduction of world inequalities among the world population.

In our present capitalist society, in order to make a new development strategy work, sustainability is the key if one's goal is long term survival of the company/institution. In order to make microfinance serve millions of poor households, it needs to demonstrate the sustainability if it wants to attract the necessary capital to serve this purpose. The Consultative Group to Assist the Poorest (CGAP) prepared a list of key principles of microfinance also endorsed by leaders at the G8 Summit held in 2004. The forth principle states that:

> *"Financial sustainability is necessary to reach significant numbers of poor people. Most poor people are not able to access financial services because of the lack of strong retail financial intermediaries. Building financially sustainable institutions is not an end in itself. It is the only way to reach significant scale and impact far beyond what donor agencies can fund. Sustainability is the ability of a microfinance provider to cover all of its costs.*

It allows the continued operation of the microfinance provider and the ongoing provision of financial services to the poor. Achieving financial sustainability means reducing transaction costs, offering better products and services that meet client needs, and finding new ways to reach the unbanked poor." (CGAP, 2004, Key principles of microfinance, Appendix A)

More interestingly some Microfinance Institutions (MFIs) have found their own way to financial viability or sustainability. On the other hand many of them have failed in this effort and private or governmental donations and/or grants still represent the reason why these institutions are able to survive.

What distinguishes microfinance from other "grassroots" development strategies is that microfinance holds out the promise that development can be made to pay for itself, and maybe even generate a surplus, enough to fund an ever-expanding number of beneficiaries on a permanent basis. Here is the opportunity to achieve program sustainability on a truly significant scale (almost unheard of in grassroots development) that provides an integral piece of poor households' livelihood and coping strategies: financial services. This promise has captured the imagination and mobilized the resources of policymakers, donors, development practitioners, and, increasingly, formal sector financial services institutions.

In the parlance of the microfinance industry, program sustainability has come to be more or less synonymous with financial self-sufficiency. Financial self-sufficiency is the non-profit equivalent of profitability. In microfinance, it is defined as when an microfinance institution's (MFI's) inflation-adjusted operating revenues, less monetary and in-kind subsidies, exceed its inflation-adjusted operating costs plus its actual and imputed (the rate the MFI would have paid in the market) funding costs. Arguably, financial self-sufficiency is the principal focus of the microfinance industry today.

The scope of this research is to find and test empirically which factors influence the achievement of financial self-sufficiency (or financial sustainability) for MFIs from all over the world. Data are generously offered by Mix Market and they will be subsequently adjusted to obtain the actual financial sustainability for each of the MFI analyzed. The study comprehends 687 institutions from 63countries and divided in five regions sub regions which are Africa,

Eastern Europe and Central Asia, South-East Asia and Pacific, Latin America and Middle East and North Africa.

Capital structure theories will be analysed to see their possible application to the microfinance sector. The study can be a guideline to those who desire to identify the viable financial self-sufficient MFIs and for those actors involved in the field, nonetheless the MFIs which are interested in the factors that influence their financial self-sufficiency.

The present study has been divided in sections for which a short description will be given:

Section 1 (Chapter 2) starts with a background of microfinance and namely its definition and main characteristics such as its importance in women empowerment, poverty alleviation and employment creation together with other social benefits. It also address the critics made to the microfinance industry, the meaning and the increasing interest of operational and financial sustainability and previous studies made regarding capital structure and financial sustainability.

Section 2 (Chapter 3) defines the methodology adopted for the empirical research; it describes data chosen for the study and analyses those data comparing them with previous studies and discussing the implications of the data chosen for the sample. It also contains the description of the variables used for the econometric model with particular focus on the financial sustainability (FSS) and the cost of capital. In addition adjustments necessary for the transformation of those variables are discussed and explained in details. Finally the quality of the model is discussed in order to illustrate its strengths and weaknesses.

Section 3 (Chapter 4) gathers the discussion form the outcome of the regression equation chosen and shows its results focusing on a variable by variable debate and an overall argument of the variables discussed as a whole in comparison with economic theories and previous empirical research. The variables which have been excluded from the model and the reasons of the exclusion are also mentioned.

Section 4 (Chapter 5) draws the conclusions of the empirical research and discusses the implications of those findings for microfinance institutions, policies and future research studies that might use the conclusions to further expand the concept and evidence of financial sustainability.

2. BACKGROUND

2.1 Defining microfinance

According to the World Bank 1.4 billion people (one in four) in the developing world were living below US$1.25 a day in 2005 and 1.7 billion people were living below 1.45 US$.[1] Among the various approaches adopted with the aim of reducing such a high poverty rate, microfinance has been widely studied and followed with interest because of its alternative to aid and donations to this particular target of population.

As briefly mentioned in the introduction, financial services offered by microfinance help low income households in the reduction of poverty and women empowerment serving also at a macroeconomic level to create sustainable economic development and employment creation.

Although microcredit and microfinance are often used interchangeably, the difference arise from the fact that microcredit only provides loans whilst microfinance has a broader meaning as it comprehends also other financial services in addition to the provision of credit. These other financial services can be savings products, insurance schemes and so forth.

In broader terms microcredit is the act to provide small loans in the range of 100$ or less to the poorest borrowers who are not served by traditional commercial banks. Over time the amount of the subsequent loans increase as the borrower repays the first loan. Besides previous repayments, the average amount also depends on the geographic region.

As it is evident from Figure 1, loan amounts vary significantly across regions in the World. In Asia, Middle East and North and Sub-Saharian Africa the average amounts are below USD 250 and they can arrive to a higher average amount of 1600 USD in Eastern Europe and Central Asia.

Microfinance relies on the principle that its clients act as small entrepreneurs who are credit-worthy. In this respect microfinance institutions become an alternative to unofficial moneylenders often present in developing countries which charge extremely high interest rates for their lending services because these clients do not have the chance to access to traditional banking channels. Another important aspect is that microfinance refrains from taking collateral from its clients, concentrating more on the social collateral and therefore on the social ties that a

1 Chen S., Ravallion M., 2008, "The developing world is poorer than we thought but no less successful in the fight against poverty", World Bank, Development Research Group, p. 18

member has within the society. Borrowers are encouraged to repay their debt because a failure in doing that would result in a social conflict with some of the other members of the community that would exercise pressure on the borrower.

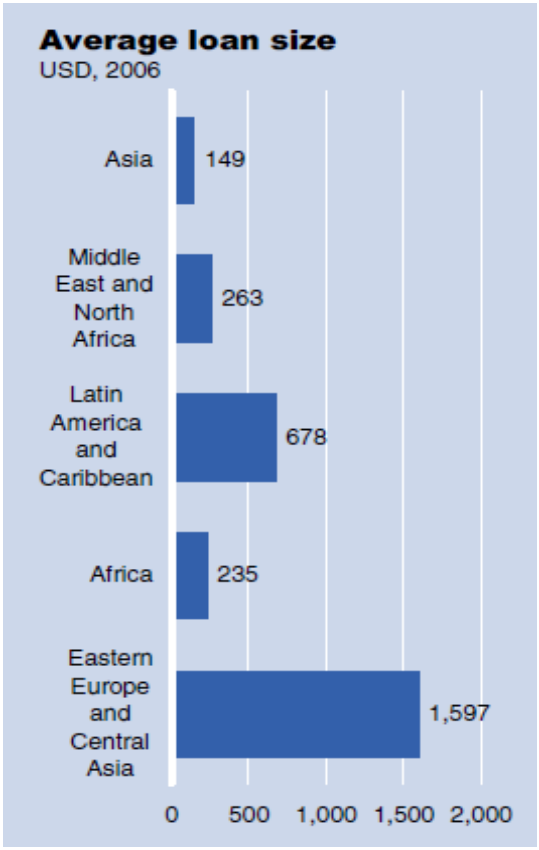


Figure 1 – Average loan size by geographical region. Source: DB Research, 2007

Loans granted can be either individual or lent to a group depending on the institution and its processes. Individual lending is usually more focused on the self-employed rather than the very poor and is similar to loans granted by traditional commercial banks without the sharing liability aspect. Moreover the successful repayment of the first individual loan leads to a second and bigger loan after some trust and repayment capability has been established.

On the other hand group lending uses the social collateral and peer pressure as a guarantee and lends to an individual passing on with the following individual only when the first person demonstrates to be credit-worthy. In this case the first individual receives the social pressure from the others and is pushed to find a way to repay its debt. Moreover some institutions decide to lend to a group the entire sum and only the leader group is responsible for the repayment.

Group lending often sees the intervention of some individuals to pay for the other members when an individual cannot occasionally pay.

The type of lenders involved in this practice can be microfinance financial institutions, credit cooperatives, rural banks, NGOs or any other financial institution created and supported by governments. To this group, other categories of intermediaries that belong to the informal economy can be added such as moneylenders that still operate in areas not yet covered by regulated institutions.

It is interesting to notice how the status of institutions may vary from non-profit organization to regular profit organization: the focus of a specific institution can be a mainly social or entirely profit-making mission. In the middle there are various combinations of the two main goals as a reason to offer financial services: many of them focus on the social mission trying to be sustainable and profitable at the same time.

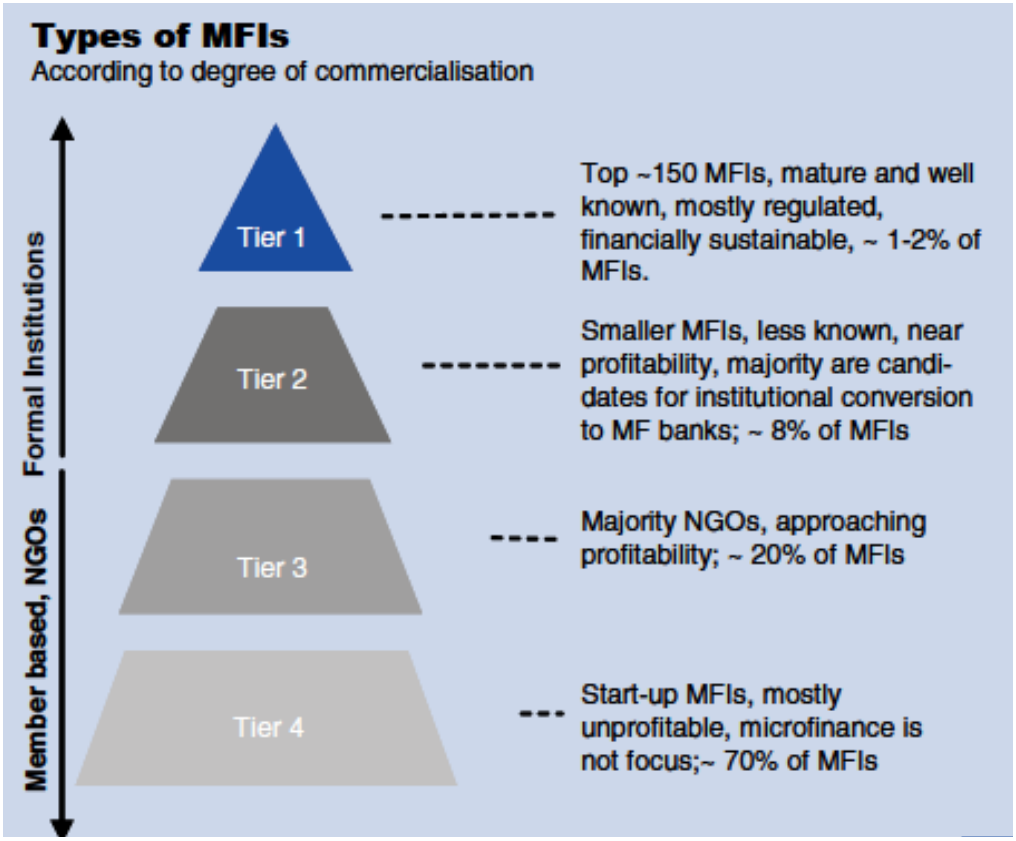


Figure 2 - Types of MFIs – Source: Deutsche Bank Research, 2007

There are about 10.000 microfinance institutions around the world.[2] Initially they were mostly funded by grants, donations and subsidies provided by development agencies, whilst as they mature they try to become more formal financial institutions or even niche banks. The report classifies MFIs into four categories according to their degree of commercialisation; the first two segments represent the most developed MFIs, whilst the third and forth segments represent NGOs and start-ups institutions which together comprise 90% of the microfinance sector. However, the first two tiers comprehending about 10% of the institutions represent alone the majority of the clients served and they also hold most of the total microfinance assets.

From an investment point of view, the top two tiers are the most attractive for private investors and commercial banks as they already showed to be profitable and they have a large client base that make them eligible to attract commercial funding.

Tier 1 institutions represent the most performant and mature MFIs which already proved to be financially sustainable and they often have a loan portfolio over USD 100 million, whilst tier 2 is made up of younger institutions on their way to become regulated and more successful MFIs.

Whereas tier 1 and 2 institutions are considered ready to absorb commercial funding and in many cases they are already absorbing it, tier 3 ones are approaching the way of profitability although they suffer the lack of capital and investments. In the last tier that represent about 70% of MFIs there are many start-ups whose main focus is often more social or have different primary goals than profitability and sustainability.

Following the notoriety of microfinance in the 2005 after the Nobel prize in economics to Prof. Yunus and Grameen Bank, the volume of the total microfinance has risen exponentially from USD 4 billion in 2001 to around USD 25 billion in 2006. The mentioned data in the Deutsche Bank report is also confirmed by the present study that shows how the 687 microfinance studied have a total gross loan portfolio of 30 billion according to 2008 figures. Although the sample of the institutions do not represent the whole sector of microfinance, they correspond to a significant amount of the loan portfolio in the whole industry around the world.

The sharp rise, besides the increasing amount of donations in a poverty eradication sector, is mainly due to increasing access of more profitable MFIs to commercial funding sources made

2 Deutsche Bank Research, 2007, "Microfinance: An Emerging Investing Opportunity: Uniting Social Investment And Financial Returns", p. 6

of debt finance and retail deposits. In addition, following the traditional life-cycle of a microfinance institution, more mature MFIs in the first two tiers started to have access to national and foreign debt, besides clients' deposits which become possible after the regulation of the institution.

Although the traditional pattern is to evolve overtime to a regulated institution that will focus on accessing debt financing with subsidized and commercial funding from development agencies or individual investors, some of these institutions are immediately setup as regulated MFI or, on the other hand, particular lenders will never have the intention to reach that stage but they are happy to stay unregulated to avoid costly restrictions.

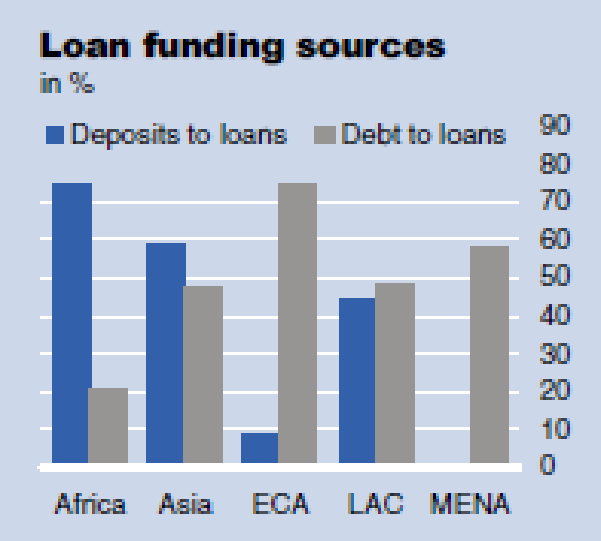


Figure 3 – Loan funding sources – Source: Deutsche Bank Research, 2007

From the point of view of the MFI capital structure, finding an optimal funding mix becomes important for the institution together with other internal factors such as growth of the loan portfolio and mobilization of deposits and other external factors like the country regulation, availability of donors, commercial lenders and openness of the national financial system.

Regional differences also become important when analysing loan funding sources for a MFI as many regions fund them mostly with deposits (Africa) because of the difficulty to access commercial debt whilst other regions rely mostly on debt (ECA). It becomes evident that the region of operation affects the leverage of the MFI.

Focusing on the capital structure is obvious that equity is the most costly source of finance followed by subordinated debt, while deposits are the cheapest way to finance a MFI when grants and donations are not considered. For foreign funding, quite common in the industry, currency risk needs to be considered especially when operating in countries with double-digit inflation rates.

Besides the capital structure, it is important to mention the maturity of the kind of funding. While equity capital usually serves as a long term funding, debt has a medium term range and deposits need to be considered as a short term funding source.

It would be important for a MFI to reach the stage where it could rely on the national funding sources, both equity, debt and national savings instead of relying on foreign funding even though microfinance finds its way in countries where the national financial sector is still underdeveloped. Microfinance in this respect can help the national financial sector to develop itself until reaching a point where it could be sustainable by itself by mobilizing national deposits.

Although the sharp rise described earlier, the microfinance industry is still unable to meet its demand. The gap between the demand and the supply offered by microfinance is astonishing as the supply is less than a tenth of the total demand of USD 275 billion. According to the Deutsche Bank Research report the untapped demand is spread unevenly around the globe with 310 millions in India alone followed by Bangladesh (70 millions), Indonesia (60 millions) and Nigeria (45 millions).

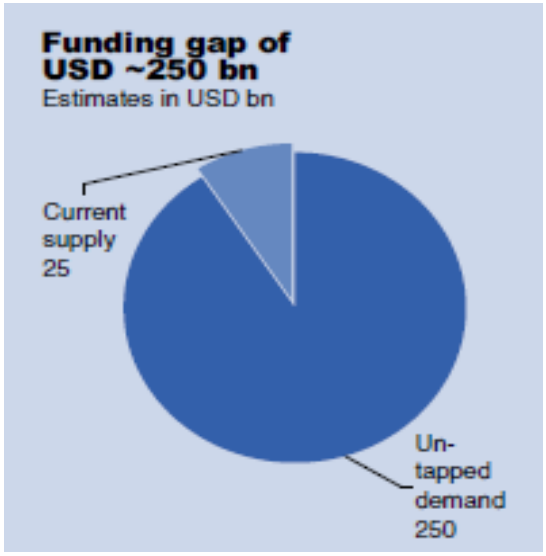


Figure 4 – Funding gap in microfinance – Source: Deutsche Bank Research, 2007

According to the Deutsche Bank Report it has been estimated that to fully meet the demand of microfinance in the world about USD 250 billion would be required against a current supply of USD 25 billion.

After discussing the funding part, another important aspect is given by the source of revenues of MFIs. Institutions must cover all their expenses with revenues if the aim to be sustainable over a long term period of time. If costs result to be higher than revenues, institutions must rely on grants or external subsidies to continue their operations. MFIs main revenues are interest, fees and commissions from their loan portfolio and they represent, on average, about 90% of their revenues. The problem with the high dependency on revenue related with loans is that an increase from costs or expenses can only be covered by increasing interest and fees on loans or by other types of subsidies. MFIs that are looking at generating additional revenues to cover their costs are therefore interested in the understanding of their sources of revenues.

An interest study made by Adrian Gonzalez (2008) separates financial revenues, considered as revenues from the provision of financial services, in three categories: revenues form loan portfolio (from interest, fees, commission), revenues from assets (interest on investments) and revenues form other services (from financial services beyond lending such as remittances or insurance). Revenues from non-operating activities such as revenues from selling a building have not been considered.

Year	Sources of Financial Revenue as %			No. of MFIs
	Loan Portfolio	Other Assets	Other Financial Services	
2003	90	5	5	235
2004	92	3	5	369
2005	90	5	6	561
2006	90	4	6	794
2007	90	4	6	892
Average	**90**	**4**	**6**	
Only for MFIs with data in both years				
2005	90	4	6	488
2007	90	4	6	488
Average	**90**	**4**	**6**	**488**

Table 1 – Sources of revenues as percentage of financial revenue – Source: MBB, 2008, No.17

In 2007, in the sample of the study, 90% of revenues came from the loan portfolio, 4% from other assets and the remaining 6% from the provision of other financial services. Clearly, most of the revenues came from lending activities as the other activities generated 10% of revenues. Moreover the trend in earlier years is somehow constant and little difference is evident among the 2003 - 2007 period (see Table 1)

Despite the apparent low percentage of revenues from other sources, MFIs rely heavily on those because for many of them represent at least half of their net income and it is not to be underestimated.

Another reason why other revenues are important for MFIs is given by the analysis of their sustainability given the contribution or not of those alternative revenues. Sustainability has been reached for at least one third of the sustainable MFIs only with the important contribution of these other revenues. In other words around 180 MFIs could continue their operations and cover entirely their costs thanks to the additional income from assets and from other services than lending. Without this alternative stream of revenues, MFIs should have charged higher interest rates or fees for loans to their clients in order to be sustainable.

Year	All MFIs	Only FSS* MFIs	Simulated without Other Revenues		
			Still FSS	Non-FSS	% FSS
2003	234	138	103	35	25%
2004	364	246	189	57	23%
2005	556	350	239	111	32%
2006	792	462	319	143	31%
2007	892	549	368	181	33%
All MFIs with data in Both Years					
2005	488	314	220	94	30%
2007	488	340	233	107	31%
All FSS MFIs in Both Years					
2005	269	269	186	83	31%
2007	269	269	190	79	29%

* FSS = Financial Self Sufficiency

Table 2 – MFIs not sustainable without other revenues – Source: MBB, 2008, No.17

However over the years the dependency on other revenues has slightly gone down (see Table 2) remaining in the range of 30%. Even though a MFI rarely invests 100% of its assets in the portfolio and with an average of about 77%, it is important for them to find a profitable way to invest the other percentage of assets which has some reserve requirements for regulated

institutions. To make the best of these assets, MFIs try to invest idle assets that cannot be used as loan portfolio complementing their revenues with the provision of other services.

All the microfinance approaches lie between two extremes namely the poverty and self-sufficiency approach. Some researchers (Schreiner 2002) describe the two approaches: the former approach targets the very poor who are very costly to serve using the traditional banking system. Success is measured by how well their needs are satisfied in the short term; the latter approach targets less poor clients than the poverty approach and the success is measured on how well a microfinance institution can be self-sufficient in the long term. Donations play a different role in the two approaches: in the first case they cover shortages between revenues and costs, in the second case they cover start-up costs and fund innovations and investments to make the institution sustainable in the long term. Every institution decides which weight to give to the different approaches which are usually difficult to combine as many institutions that want to be sustainable in the long term shift the client base towards less poor clients.

Although the difficulty to combine these aspects, Grameen Bank demonstrated and proved that it is possible to serve poor clients and be sustainable: in fact Grameen clients who become also bank shareholders are selected only and only if they result as poor according to a standard questionnaire prepared by the bank loan officers.

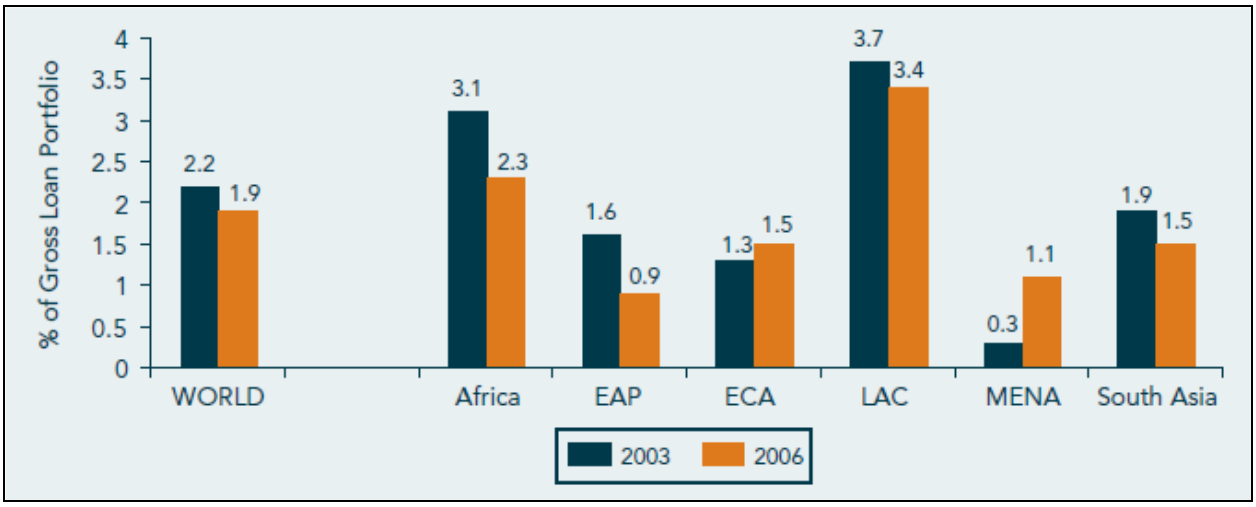


Figure 5 – Annual loan losses as percentage of GLP – Source: CGAP, 2009

One of the reason why microfinance institutions became of big interest around the financial world is the high repayment rate registered in the area of 95% and low default rates (see Figure

5). In fact in the period 2003-2006 a sample of 175 sustainable MFIs registered a further decrease of the annual loan loss rate from 2.2% to 1.9%. Several regional differences are present ranging from 0.9% to 3.4% in 2006. These simple numbers explains the willingness to repay loans received by those that are considered poor and do not have the possibility to meet traditional banks parameters and restrictions to access credit.

Interest rates charged are usually very high taking into account the high administrative costs associated to a single loan with low amount in the range of few hundreds dollars. Some criticize the very high interest rates which can be very high when compared to traditional financial institutions rates. Cull et al. (2009) find that higher interest rates are not typically charged by banks but by organizations focused on social missions with a median of 25% instead of a median of 13% charged by banks. Cull finds the explanation in the cost patterns of the two different institutions: banks and some NGO exceptions like BRAC and ASA in Bangladesh usually serve millions of clients and the ratio of borrowers is 3:1 compared to NGOs.

Even though previous studies underline the fact that scale advantage is not very important and disappears after 2000 clients (Gonzales, 2007), institutions benefit from a big number of clients by offering them larger loans and more services. The difference among the two kinds of institutions lies in the capability of banks to keep operating costs per dollar outstanding in loans lower than what NGOs do (12 cents to 26 cents).

Moreover they find that operational costs rather than capital costs or loan loss provisions that drive the difference between the various kinds of institutions. Obvious findings comprehend the fact that institutions with smallest loans have both the highest cost per unit lent and the highest interest rates charged to their customers.

Finally they do not agree with the statement of Yunus that interest rates can be comfortably be in the range of 15% seeing that most institutions charge way above that desired rate. Lower interest rates for loans of that size would require consistent subsidies to allow the continuing of operations.

Mission drift is another aspect to study within the filed of microfinance. As the institution matures, the possible profitability and the ways to obtain it might push MFIs towards a shift from their original mission and objective. Cull et al. (2007) takes into consideration this important aspect finding that financially sustainable institutions have smaller average loan size and lend more to women, suggesting that the pursuit of the outreach to the poor and profitability can go

hand in hand. However there are some influences: group based and larger individual based institutions tend to aim at bigger loans and lend less frequently to women just as older individual based institutions do worse outreach wise than younger ones suggesting that as an institution grows and mature increasingly focuses on customers that can absorb larger loans.

2.2 Characteristics and benefits of microfinance

The characteristics of microfinance are several and the practices put in place from the industry are well known. Reasonably high interest rates are applied to loans of low amount to borrowers with certain characteristics such as being poor or below the poverty line with a particular preference of women borrowers. Moreover the group lending technique is also part of the practices which serves as a substitute of the traditional collateral required by commercial banks.

In the next paragraphs we focus on the reasons why these principles are applied both from a social and economic point of view depending on the factor analysed.

2.2.1 High interest rates

High interest rates charged by MFIs have often attracted the attention of policymakers around the world. Governments question themselves whether it is right and in the general interest to charge high interest rates to their poor population. Historically governments of developing economies have used interest rate ceilings with the double objective of protecting their population from usury rates and pushing the national MFIs to find innovative ways to be more efficient and competitive. In 2004 about 40 developing countries were adopting some sort of interest rate ceilings. [3]

However this kind of policy might hurt the youngest and less formal institutions which are not able to cover their costs driving them out of the market or keeping them away from entering it and, as a consequence, this causes a further shrinking access of the poorest people to credit. Another consequence is paid by the people who must revert to the informal credit markets (moneylenders) which result to be more expensive. Ceilings not only add less transparency

3 CGAP, 2004, "Interest Rate Ceilings And Microfinance: The Story So Far", Occasional Paper No. 9, p. 1

(because of hidden fees in their services) but also do not have the desired effect that can be easily overcome by the addition of initial or membership fees.

Bangladesh and Bolivia are examples of countries where high levels of the microfinance market penetration have been reached. These countries started by having a liberalised market economy by not regulating in the application of interest rate ceilings and let market forces and competition bring the price (interest rate) down. Lately, however, both countries started to impose some ceilings concentrating especially on small loans where the interest rate is usually higher.

There are three forms of ceilings of which it possible to find a combination of those within a same country:

1. *Banking interest rate controls*. These types of controls are codified in the banking laws, which usually allow the Central Bank to fix a maximum lending rate for regulated financial institutions (both commercial banks and MFIs). Following the financial sector liberalisation these controls have been mostly abandoned even though they remain in place in few countries.
2. *Usury limits*. Usury laws are generally part of the civil law of the specific country and they allow a government body, usually the central bank, to set a limit that lenders can charge. In some cases institutions that fall under the banking law are not subject to the usury limit which is aimed at protecting private and consume lending.
3. *De facto ceilings*. In countries where the de facto ceiling is in place, formal interest rate ceilings are not codified in any law, but political pressure and the need to compete with government subsidized programs keep interest rates down.

There are two determinants that affect the consequences of this policy and these are the level of interest rate ceiling and the level of enforcement. In some countries low ceilings might not have effect on commercial and urban microfinance but they could have a big impact on rural lending.

The level of enforcement highly depends on local conditions, the clarity of the regulation and to the incentives and the institutional capacity of the agency in charge of the enforcement. It is not uncommon that enforcement of these agencies becomes difficult because of the capacity required as the law often applies to a large number of non-bank institutions or even individuals.

The best way to reduce the interest rates is not through setting ceilings which have the side effect of reducing the access to credit by making it impossible for some institutions to be sustainable, they are difficult to enforce and in many cases undermines the transparency of loans and their true fees. Governments and donors are to promote competition and innovation that improves efficiency and lower costs. Furthermore consumer financial education is important to let customers have the right skills and knowledge to make smart financial choices. [4]

The costs of microcredit are high but it is not entirely due to the higher risk of lending to the poorest people. It is demonstrated that many microcredit programs have default rates lower than traditional commercial banks. The higher costs are given by different variables such as the delivery costs of smaller transactions and because of the use of face-to-face contact (labour time) as a substitute to collateral or credit scoring activities.

Offering a small loan entails higher costs than offering a bigger loan: whereas the loan loss risk is the same in percentage terms, administrative costs are not proportional to the loan size. Administrative costs for a loan f USD 1 million might be indicatively USD 30.000 or 3% in staff time and other costs deriving from appraisal, disbursing monitoring and collecting. Microloans of USD 100 have in comparison higher costs than 3%. Therefore while banks can charge the additional costs by asking an interest rate higher than 3%, MFIs cannot behave in the same way because their costs are higher than 3%.

Giving the number of clients and the number of transactions every year, MFIs do also have many more transactions to take care of and every transaction costs time and money to the institution.

If the cost of capital is not taken into account, the costs which need to be covered by loan interest rates are the cost of funds for the lending, the loan loss and the administrative costs (identification of clients, processing of applications, collecting repayments and the monitoring).

Even though MFIs are more productive per unit interaction with a client (visit to a client), the higher number of interactions translates to 25% of the total outstanding loans against a 5-7% of traditional banks.

The claim from the developed countries that interest rates in microfinance are too high is only true if compared to those countries where an efficient and sound financial system is in

4 CGAP, 2004, “Interest Rate Ceilings And Microfinance: The Story So Far”, Occasional Paper No. 9, p. 15

place. Developed countries do not have informal sources of moneylenders to the same extent of developing countries. In few cases those informal moneylenders can charge up to 10 percent per month giving borrowers an incentive to turn to MFIs to ask for cheaper credit.

Country	Commercial banks APR	MFIs APR	Informal sources (e.g., moneylenders) APR
Indonesia	18%	28–63% (BPRs, local-level microbanks)	120–720%
Cambodia	18%	– 45%	120–180%
Nepal	11.5% (priority sectors) 15–18% (other)	18–24%	60–120%
India	12–15% (to SMEs)	20–40%	24–120% (depending on state)
Philippines	24–29%	60–80%	120+%
Bangladesh	10–13%	20–35%	180–240%

APR: Annual percentage rate

Table 3 – APR comparison among financial intermediaries. Source: CGAP, 2009

Table 3 shows the comparison of interest rates charged in six Asian countries where the difference between the three types of financial intermediary (both formal and informal) is evident. On a similar level other studies put the interest charged by MFIs in the range of 15% - 70% with examples of informal moneylenders who are charging up to a comparative annual interest of 1000% for a monthly loan in the Philippines (Deutsche Bank Research, 2007).

The question whether interest rates are climbing or dropping is another issue at the attention of the researchers. Microfinance practices and institutions developed mainly over the last 20-30 years and the industry is still nascent in most countries. Standard economic theory would lead us to expect a reduction of the costs driven by economies of scale and of prices driven by competition. In Bolivia a study case with data from 1992-2007 showed the drop of interest rates from 60% to 17% (- 43%) against a drop of bank rates of 12%. [5]

In order to analyse whether Bolivia was an isolated case or not, a subsequent research of 175 sustainable MFIs around the world and grouped in six regions analysed the interest yields of

5 CGAP, 2009, "The New Moneylenders: Are The Poor Being Exploited By High Microcredit Interest Rates?", Occasional Paper No. 15, p. 8

selected MFIs reaching to the same conclusions of the previous Bolivian interest rates study. Indeed MFIs interest rates dropped significantly at an average rate of -2.3% in the period 2003-2006 in all the regions of the world with the exception of Southern Asia which remained substantially unchanged.

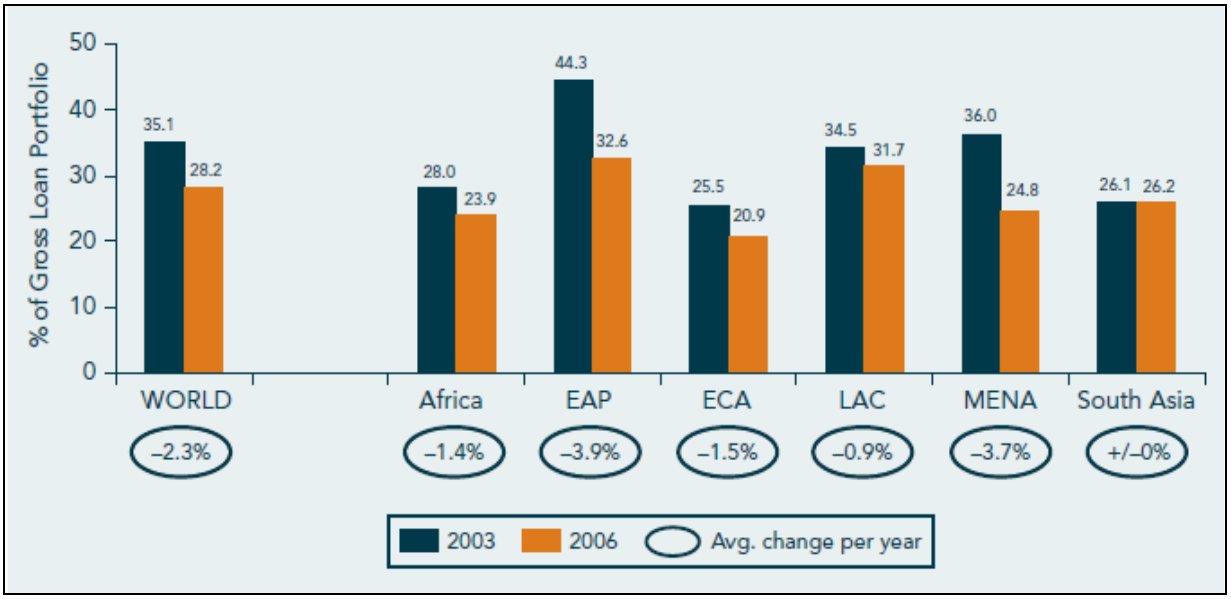


Figure 6 - Interest yield trends 2003-2005 - Source: CGAP, 2009

2.2.1.1 Affordability of high interest rates

Poor people with no access to credit generally consider the access itself more important than the interest rate charged and the fact that they return to borrow again is the proof that microfinance loans even with high rates are beneficial in some way to the individual borrower.

Similar and sometimes better repayments rates than traditional banking also testify the affordability which would be otherwise reflected in the default rates. Moreover the possibility to repay loans with high interest rates is given by studies showing that small businesses and especially commercial traders have a higher return per unit of capital than larger businesses.

Research conducted in India, Kenya and Philippines found that the average return on investment in small enterprises ranged from 117 to 847 percent. [6]

6 CGAP, 2004, "Interest Rate Ceilings And Microfinance: The Story So Far", Occasional Paper No. 9, p. 3

Thus the cost of opportunity to improve their social situations and those of their families is proved to be paid thanks to the high returns that small businesses offer.

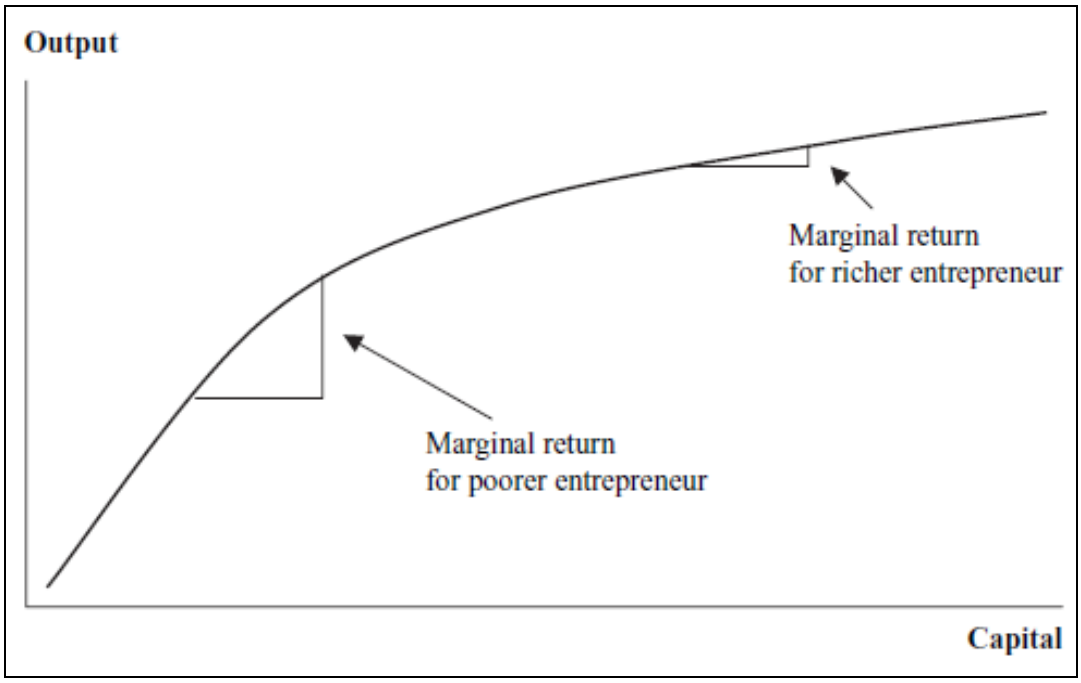


Figure 7 - Marginal returns to capital with a concave production function. Source: Armendariz de Aghion, Morduch, 2005

From an economic point of view the mentioned researches (Harper, Hossain and Diaz) are indeed confirmed by basic economic theory. The principle of diminishing marginal returns to capital (see Figure 7) says that a small firm with little capital is able to earn higher returns for every unit of capital used than firms with larger capital.

According to this economic principle, poorer entrepreneurs should be able to pay higher interest rates than richer counterparts. The concavity of the curve assumes that a firm that invests more should expect to produce more output, but every additional unit of capital will bring smaller and smaller gains.

Therefore a small entrepreneur such as tailor that buys her first sewing machine for USD 100 will increase her production much faster than she could with only needle and thread. The second USD 100 investment for a set of scissors will also bring gains but the incremental increase is not likely to be as big as the one generated from buying a sewing machine. The

contrary would happen only in case of mistaken judgement from the tailor: a wise tailor would buy the item that allows her the greater output.

As a consequence the incremental gain determines the ability of the borrower to pay. As it is evident from the concavity, the poorer entrepreneur has a greater return on his next unit of capital and is willing to pay higher interest rates than the richer entrepreneur. In these conditions a poor borrower can borrow at 100% interest rate and still have a surplus.

However, whether this situation holds true for all the poorer, it depends on the assumption that all the other factors such as educational level, commercial contacts, access to other inputs stay constant and are the same for both rich and poor entrepreneurs. This situation is difficult to be always true and therefore there will be cases where the poor marginal gain per unit of capital will be lower than the richer entrepreneurs. Moreover there are scenarios and industries where the production function is not concave but it has a shape that shows higher marginal returns at higher level of capital. In this case the poorer entrepreneur is disadvantaged because he cannot pay for capital at high prices having in return a smaller marginal gain than the richer entrepreneur.

In these particular situations the poorer entrepreneur can never reach the better off entrepreneurs remaining in the so called poverty trap.

Other researchers in the field of microfinance (Cull et al., 2007) tried to answer whether customers are still able to repay their loans if the interest rate is raised. In particular they analysed whether raising interest rates pointed towards agency problems such as lower repayments and less profitability. The difference in results is given surprisingly by the institution's lending method: individual based lenders that charge higher interest rates are more profitable than others up to a specific point over which profitability tends to be lower. In fact over that threshold delinquency rates are higher and at the highest rates a fall in credit demand follows. On the other hand, within solidarity group lenders, financial performance tends not to improve even though the social mission might push MFIs to charge low interest rates and thus earn lower profits.

2.2.2 Repayment rates

High repayments rate are without doubt one of the main achievement of microfinance. Many MFIs report repayment rates often greater than 95%, higher than many established

commercial banks in developed countries and this comparison helped to draw attention also from popular media together with the increasing interest generated by microfinance in financial markets. Many specialized funds have been created to specifically invest in the microfinance industries (e.g. Deutsche Bank, Dexia).

Although theories of progressive lending, joint liability contracts, frequent repayments might explain the reasons of high repayment, Jonathan Morduch raises issues of validation about ten years ago in one of the milestones of the microfinance literature (The promise of microfinance, 1999). He is concerned with the method of calculation used to compute these rates during his study of Grameen Bank's repayment rates from 1985 to 1996. The overdue rate is only 1.6 percent but the accounting practices are not the conventional ones and it underestimates the actual overdue amount due to the rapid increase of portfolio over the years resulting in an adjusted 7.8 percent of overdue amounts for the same period. At the same way the bank was found late in writing off its debt expecting an income that it would probably not come and stating an higher amount of profits.

Although the rate of over 90% of repayments is still impressive compared to other programs, it could raise financial issues in the long term if necessary accounting practices are not enforced. However it is not necessary if the mission of the bank remains more social by bringing financial services to the poor and staying profitable in contrast with the pure maximisation of the bank's profit.

The puzzle for economists have been for a long time the combination of high interest rate and high repayment rates as previous studies show a negative relationships between the two factors suggesting that adverse selection and moral hazard problems would present by discouraging creditworthy borrowers or by temping them to opt out for riskier projects (Stiglitz and Weiss, 1981).

Emran, Morshed and Stiglitz (2006) attempt to address the issue by departing from the traditional focus on credit markets examining the implications of imperfect or missing labour markets for poor women in developing countries. They demonstrate the fundamental role played by the labour market structure in making the small scale investments creditworthy even with the application of high interest rates, in particular for those households with little or no collateral.

A repayment indicator often used in the microfinance industry is the Portfolio at Risk (PAR) which indicates how much of the outstanding portfolio is at risk because part of the

amount has not been timely repaid. Although this measure does not reflect a risk indicator and the consequent future losses, it is used together with the arrears amount as a ring bell when the value rises over a certain limit. In Figure 8 is presented the trend and the approximate values of PAR in the years 2006 and 2007 from many institutions around the world.

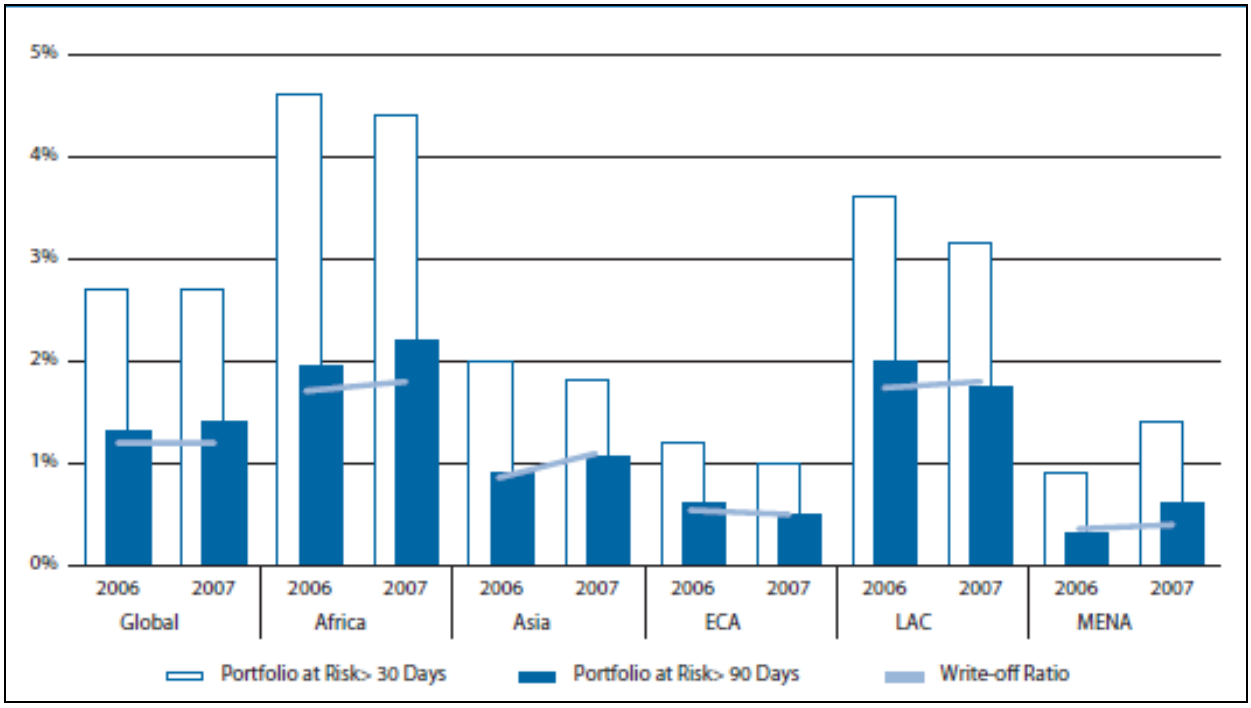


Figure 8 - Portfolio quality. Source: MBB, 2008

In Figure 8 regional differences are evident with the most performing regions in terms of PAR being Eastern Europe and Central Asia together with Middle East and North Africa. However on a global level both PAR at 30 and 90 days are between 1% and 3% with a write-off ratio slightly above 1% suggesting a general high level of repayments in the microfinance industry.

2.2.3 Women empowerment

One way through which women empowerment can be achieved is through economic empowerment because women's access to credit gives them a greater role in economic decision-making. Further impact happens through increased well-being and higher political and social empowerment.

Economic empowerment gives women with access to savings and credit services to an increase in decision-making. When individuals have control over their decisions, they go towards optimization of their own and household's welfare.

Particular focus on women comes from the initial Yunus's conviction that lending to women has a stronger impact in the welfare of the household than lending to men. Although the initial difficulties encountered, also because Bangladesh is an Islamic country where the culture is not usually in favour of women having to deal with money issues, Yunus efforts to concentrate on this gender paid off and now the women clients count for 95% of the total.

Yunus's visionary approach has been confirmed by a large volume of literature on the microfinance industry. Social transformation has been found both in terms of lower fertility rates and higher literacy rates for women in countries where microfinance is predominant.

Pitt and Khandker (1998) show in their research that providing women with access to credit has a positive impact on the children's education, the use of contraceptives and the value of non land assets. Khandker (2005) studies the difference between borrowing to a man and a woman finding that on the latter case the impact on per capita household expenditure on food and non-food items is greater.

Beside the increased expenditures, borrowing to women has the effect of well-being enhanced by other welfare interventions in the areas of education, nutrition and health which aim to decrease women vulnerability. Smith (2002) uses an empirical approach with data from Honduras and Ecuador to compare institutions which also offer health services in addition to those that concentrate only on credit. Health improved in both countries where the clients were also offered health services. In particular the participation in the latter institutions reduces the tendency to switch to bottle feeding as the household income rise for those children under the age of two for which breast feeding is a key health-improving behaviour.

Additional advantages for MFIs that lend to women are the higher risk aversion of women in the investment decision, the bigger fear of sanctions and the less mobility than men; these are all factors that make the collection easier and repayment rates higher.

Areas of empowerment are not only confined to economic and well-being but also in the social and political ones. In this respect a woman's increased income and economic activity has a positive impact in the community she lives in having access to knowledge, networks and having

improved skills. Being an active member of a social group or a community leads to wider movements for both social and political change.

However many studies questioned how microfinance can benefit women (Goetz 1996), whilst others examined the effectiveness of strategies for empowerment and the alternatives that could be more effective in alleviating poverty (Ebdon 1995 and Rogaly 1996).

The increasing measures that aim to financial self-sufficiency of MFIs are also a point of awareness for scholars and donor agencies which see the potential to limit benefits to empowerment and poverty alleviation (Buckley 1996, Rosenborg 1998)

Linda Mayoux identifies four different views used by researchers on the link between microfinance and women empowerment:

1. Positive evidence and optimism about the sustainability of the combination of microfinance programmes and women empowerment.
2. Limitation to empowerment explained by the poor design of the programme
3. Recognition of women empowerment for alleviating poverty in a general sense but identifying the limitation of microfinance programmes to promote empowerment.
4. Microfinance seen as a waste of resources.

Finally Mayoux identifies that empowerment is not a prerequisite of microfinance programmes and that cost-effective ways to combine microfinance services and empowerment intervention are still lacking. Unless empowerment is an integral part from the beginning of the process, it is likely to have little contribution within microfinance.

Women empowerment importance has been also studied by Thomas and Sinha (2009) that show that the importance of legal status of the institution contributes to the evidence that microfinance can provide more income and savings for the poorest women and thus work on this specific micro level. Especially NGOs, unlike formal loan institution, provide layers of support to enable women to earn successfully an income and repay loans.

Moreover targeted programs help women to gain self-esteem facilitating education and the gain of technical skills building supportive networks among women and the non-government organization.

Besides personal challenges that NGOs need to address such as levelling differences in education, taking care of children, work opportunities, the organization needs to pay attention also to issues such finding or expanding new markets for women' products.

Networks created have been particularly found useful among those women who received a loan not only because of the fact they could encourage themselves but also for holding each other accountable, one of the pillar stone of Grameen Bank in Bangladesh.

Moreover unlike traditional loan providers, NGOs address multiple individual factors complementing microloan programs with other programs of other nature. NGOs usually need relationship building, additional time and effort to provide women with alternative and suitable markets for their programs. However NGOs may not also be seen the most effective partners to bring about policy changes and social transformation that must occur if women are to have access to the support they need to participate to income generating activities.

The study also underlines the importance to provide women' health, welfare and fair wages other than simply participating in a income generating activity if one wishes to empower women. Thomas and Sinha believe that microfinance is a necessary but insufficient strategy for meeting credit needs of poor women who do not have access to the traditional sources of credit. They recognize the importance of microfinance to empower women financially even though they suggest empowerment is reached by combining it with support groups, literacy and technical skills building.

2.2.4 Poverty reduction

In the latest years, a number of researchers moved their field of study from the short term to the long term strategies for poverty alleviation. Microfinance programs are claimed to be a viable option to involve poor people in the formal economic sector allowing them to be lifted out of poverty.

On of the first research in the field (Wahid 1994) illustrates and measures the increase in per capita income for the same bank members of Grameen Bank and other similar programs in Bangladesh registering a significant increase in per capita income in the two periods which have been examined. When only women were taking into consideration, Grameen Bank was by far the first among the other programs.

In another continent, Adongo et al. (2006) studies the effect of microfinance and the increase of financial services on the poverty alleviation and reduction in the rural areas of Namibia. The approach considers two variables to measure the relationship between improved

access to financial services and poverty reduction: household income and the food consumption ratio (FCR).

Adongo found that when income is used as a measure of poverty, improved access to financial service is positively associated with higher levels of income for household in both urban and rural areas in Namibia ad it has a role to play in poverty alleviation in rural areas. Moreover the usage of informal forms of lending seems to be present in rural areas irrelevantly of the level of income suggesting the high demand of microlending services for low or medium income people. When the other measure (FCR) is used as a poverty measure, the findings suggest the irrelevance of the access to financial services for the severely poor in rural areas.

According to Adongo, it is not purely the access to financial services and credit that benefit the poorest people even though the income is positively associated with access to those services suggesting that alone the access to financial services might not be a sufficient way to address the poverty issue in rural Namibia. He suggests a deep understanding of how the informal networks operate is important in order to avoid pushing formal alternatives that may erode benefits derived by those accessing financial services from these informal providers.

2.2.5 Employment creation

Employment creation has often been indicated as one of the positive impacts and spill-over of microfinance. At the same time it is also difficult and costly to measure with precision. Although the direct effect can be measured, side effects such as school drop out because of employment are more difficult to relate and divide them by the real reason.

The concern for job creation resonates increasingly in the microfinance industry itself: for this reason many institutions and their belonging networks justify their work also with the expected impact on job creation. Donors are usually also interested in seeing an improvement from this point of view, should they decide to continue their support through donations. For example, Opportunity International, claimed having created or maintained over 1.2 million jobs in 2004 worldwide. [7]

However it can be argued that the term employment might not mean fulltime positions or even more importantly stable and well remunerated jobs but also unpaid jobs for children of the

7 Opportunity International Annual Report, 2004, p. 7

family which are not remunerated and might have consequences for the children education. It is often to be analysed the productivity and the social conditions for these positions.

Employment is not generally an explicit or exclusive goal for MFIs but it is contained in a way or another in the missions of most of them together with income generation, risk management and empowerment. As previously mentioned the impact of employment on microfinance can be hard to find and in order to do that Balkenhol states in its study for the impact of microfinance on employment that it is important to consider that:

"*Employment is an indirect effect of microfinance, filtered by decisions made at the level of the MFI client and not by the MFI itself. In fact the entrepreneur is responsible for the budget allocation decisions even though the MFI also decides which clients to choose according to various parameters inherent of her activity*".

There are different forms of employment. Microfinance has a primarily effect to be found on self employment and unpaid family labour whilst it has a smaller effect on wage employment outside of the family.

The common nature of clients served by MFIs is usually a family enterprise. Therefore in a similar environment there might be shifts and substitution effects of labour where unpaid family workers are more likely to be included as workforce with the first loan whilst non-family labour is added with repeated loans as the business grows.

Quality of work and its productivity can be also tricky. In a business with enough income where the owner's children are sent to school and additional professional and qualified labour is hired, the work quality is enhanced for the business. However there might be scenarios where taking out loans means for a business using family members at low or no wage. In this case work quality could easily deteriorate.

In regards to the type of employment, Balkenhol suggests that the biggest impact is made on self and family employment and only in a small part on employment outside of the entrepreneur family.

Increased employment is also documented by one of the first studies on microfinance and Grameen Bank. In its research Wahid (1994) indicates a study from Hossain which underlines the creation of jobs within the bank clients counted as man days of work. In this case it is the membership and the consequent involvement in a group that strengthens and develops networks that opens up possibilities for Grameen Bank members.

2.3 Critics of microfinance

For every argument there are always criticisms. In this paragraph the critics on microfinance are exposed. This will help also to find the challenges that microfinance faces and will face during its development process.

2.3.1 Government programs reduction

One concern from critics is the excuse that many governments would use to reduce or eliminate poverty reduction and aid programs so that it would become an area for which the private sector alone will be responsible.

2.3.2 Balance between two competing incentives

Besides the stated goal of some MFIs to alleviate poverty, they also need to survive and in order to do that they need to charge interest rates high enough to counter risk and the dilemma is the point where an MFI chooses to be among the financial self-sufficiency and the providing of services to the poorest. In fact some MFIs focus on reaching areas that already-existing rural banks would not reach. Many MFIs are also accused to charge very high interest rates or not reaching the poorest and therefore they are often seen as focusing on being self-sufficient at the expense of the alleviation of poverty (Hughes and Awimbo 2000). The proposal of setting limits in the interest rates might have implications in the objective of servicing the poorest and at the same time can also discouraging potential investors or put a MFI out of business without donations to cover some of its expenses (Fernando, 2006).

The alternative which leads MFIs to higher repayment rates and increased self-sufficiency of the MFI is the targeting of less risky poor who already have an established credit history, a running business and they sometimes have the possibility to offer some sort of collateral as guarantee of their repayment. In this case, it is not surprising that many programs moved away from group lending to the individual one with an improved repayment rate just as wealthier villages are sometimes preferred for microfinance programs.

However the selection of base clients can be affected by donors, which are often foreign and interested in performance indicators. NGOs relying on those donors desire to offer a positive

feedback to them and the choice between a poor clientele and high repayment rates is always weighted.

As many studies show (among the others Ahmad 2003), avoiding the poorest in the community by offering loans to less-poor people instead, appears to be a strategy used many times by MFIs. Ahmad shows the trend in Bangladesh with different programs and this potential problem is addressed in one of Yunus's claim:

> "*The inability to reach the poorest of the poor is a problem that plagues most poverty alleviation programs. As Gresham's Law reminds us, if the poor and non-poor are combined within a single program, the non-poor will always drive out the poor. To be effective, the delivery system must be designed and operated exclusively for the poor.*" (Yunus 1998)

2.3.3. Women empowerment

Another kind of criticism has focused on the issue of empowering women. While many MFIs have decided to lend entirely or mainly to women, some studies of women borrowers showed that control of the loan often transfers to their husbands or other male relatives, depending on the program, region, or measurement. Women have been seen redirecting loans to men just in front of the institution field officers. Moreover some women also have been asked to join by their husbands taking to the attention that some women might not be the end user of the loans while being at the same time liable for the loan repayment. (Goetz and Gupta, 2006)

It is argued that microfinance does little to transform the status of women in terms of occupational choice, social status within the family and mobility. Therefore microfinance alone hardly empowers women in any meaningful sense.

2.3.4 Women borrowing from relatives to pay off the loan

Another fundamental criticism is the fact that some women clients of MFIs are found to be borrowing money from relatives in order to pay off the loan (Brett 2006, Desta 2009). Because of the high interest rates working as a deterrent to their economic development, these customers were not improving their situation. The result is that many women did not make enough money from their businesses to repay their loans without putting themselves into further debt with family members.

A study has been made for two programs in Bolivia where women found easier to borrow than to repay and although repayment rates were remarkable, these clients faced great pressure and repayment schedules.

In order to repay the loans, women utilized three kinds of strategies. Borrowing from their social network or selling household items has been found the most common (92%) and accessible strategy used followed by reduction of food in quantity or quality. The third and last way to meet repayment schedules was making more money by obtaining further work besides their business. (Brett, 2006)

In few words, women were glad to get access to some sort of credit, even at high interest rates although some of them struggled to pay off the debt with interest rates lower than the competition. However they might find themselves in further debt that in the long run can be unsustainable and give little room for social advancement.

2.3.5 Poverty alleviation

Poverty alleviation is one of the most debated criticisms in the field. Many researchers point at the actual effect of microfinance working for the poorest. Microcredit, although has relevant non-economic benefits, economically improves only lives of the better-off poor, doing much less for the poorest (Desta 2009).

In order to say whether microfinance helps or not the poor is necessary to define who the poor are. Before moving on with providing loans, the concept of poverty needs to be operationalised. Most researchers and institutions developed the following indicators for this purposed: low income (World Bank and projects in Bangladesh), lacking capabilities, Human Development Index or HDI (UNDP), lacking socially perceived necessities, feeling of poverty and suffering from a combination of poverty aspects.

Desta analyses the effects of microfinance programs and he does not necessarily find the alleviation on poverty. On the other hand, he shows some sort of social development at different levels for each program studied. In particular he noticed improved agriculture production, improved nutrition, mobilization of the community, increased food security, women empowerment, perception of an increased personal situation and in one case the increase of the clients' assets and income. Although those programs were designed to tackle poverty,

researchers failed unless in one case to recognize and measure the poverty level of the beneficiaries of those programs.

2.4 Operational and financial self-sufficiency

Since the study of microfinance the definition of sustainability has been given various interpretations. However, lately, scholars and experts converge to identify two levels of sustainability from the initial three or four. The most accepted and widespread definitions are operational self-sufficiency (OSS) and financial self-sufficiency (FSS) which at a rate of 100% define an MFI as operational or financially sustainable. However, they can be both defined differently by MFIs, donors or analysts where the difference usually lies in the inclusion of financial costs.

The operational self-sufficiency can be described by the capability of an institution to cover with their revenues the operating costs that incur in the business.

Some believe that it can be calculated by the ratio between operating income and financing costs added to provision for loan losses and operating expenses. Others believe financing costs need not to be considered because different MFIs at different sustainability stages fund all their loan portfolios through concessional loans, donations or grants. Both of methods seem to be accepted as long as the comparison is uniform among the data being analysed. Bogan, Johnson & Mhlangay (2007) use the old definition adopted by MixMarket for their own analysis of the OSS which did include financing costs but did not include provision for loan losses.

The financial self-sufficiency is also measured very differently by experts in the literature or in their studies.

Bogan, Johnson & Mhlangay define an MFI being financially sustainable when OSS reaches 110% which might be a reasonable assumption when analysing a single country with certain characteristics. However it most likely leaves the model to be biased to substantial errors when a cross-country analysis is carried on due to different commercial rates of debt and inflation rates.

Adongo and Stork (2005) refer to the calculation of a break-even interest rate to derive the FSS. This approach implies different assumptions which are rarely present in the microfinance industry and among its practices. As an example Adongo and Stork made the assumption that the principal lent by the MFI is always equal to the principal paid back by the borrower: fees at the

moment of issue of the loan are the norm in the industry and represent an important source of risk free income and an immediate source of cash flow for the microfinance institution.

The objective of FSS is to measure whether an institution earns enough revenues from loans to cover for operating expenses, financing costs, provision for loan losses and cost of capital which is excluded from the OSS. The cost of capital measures the capability to maintain the value of equity intact from inflation; liabilities, on the other hand, are not affected by the effect of inflation. In addition, as it is very common for MFIs to obtain concessional loans, it includes the cost of obtaining commercial rate loans.

Later on in the paper it will be explained in details how the financial self-sufficiency is calculated for the purpose of this paper using the OSS as a starting point.

2.5 Theory and previous studies

In the past years there have been few studies focusing on the financial sustainability of microfinance institutions and other factors that can influence it. As the MFIs continue to blossom around the world spreading the concept of microfinance in all the continents, researchers are interested to study whether MFIs can be sustainable over time. Some of those institutions have assumed the status of non-profit organisations, concentrating their efforts mostly on the social part of the lending process. These institutions often base their survival on grants, subsidies or aid from those organisations or individuals willing to support them. On the other hand, many entrepreneurs observed the possibility to run a for-profit business, some banks in developing countries extended their services to their wider population that did not have any access to financial services.

Before moving on to the research made on the field of sustainability, another interest aspect to mention is the capital structure of those institutions and its influence on profitability and therefore on sustainability. Capital structure has been studied since the late 1950s and its composition is part of the agency theory.

2.5.1 Capital structure

One of the aspect to be considered as part of the sustainability is also the capital structure chosen by a microfinance institution. The MFI's structure is substantially made of debt and equity and their combination and ratio forms the capital structure of a MFI and any other

company. However the most efficient capital structure can depend on many variables. From a theoretical point of view, more than half a century ago, Modigliani and Miller (1958), tried to find an answer to this question. Their interest of study is the arising of possible agency costs because of the existence of separation between ownership and control of the firms which might happen both in financial institutions (and MFI) or non-financial institutions. They concentrated in the eventuality that managers would engage in decisions and objectives different from the owners' goals which would create agency costs measured as the lost value due to managers taking decisions against those of the company.

Modigliani and Miller, in their study, argue that capital structure is irrelevant to the value of the company and that position has been supported also by Stiglitz a few years later. They set the following assumptions: existence of perfect capital market, homogeneous expectations, absence of taxes and no transaction costs. However these restrictive assumptions are not applicable and the conclusion does not held in the real world. In 1963 the same researchers incorporated tax benefits as determinants of capital structure recognizing the importance of the interest as a tax- deductible expenditure. The company which has a debt on which it pays interest can have substantial benefits in the measure of a tax shield at the moment of honouring its tax payment.

In this later version Modigliani and Miller state that a company is better off having as much debt as possible because it would maximize its value by paying lower taxes.

During the last part of the last century other pointed out, under different assumptions, that high leverage or low equity/asset ratio reduces agency costs increasing company value constraining or encouraging managers to act in the interest of the owners or shareholders through the threat of bankruptcy which causes personal losses to managers' salaries and reputations (Williams, 1987).

Berger and Bonaccorsi di Patti (2006) added few other concepts to the previous importance of relatively high debt ratio. Whilst a high ratio of debt might reduce agency costs, on the other side the same level of debt will increase them for two reasons: firstly, if a company leverage over a certain point, it also increases the expected costs of financial distress, bankruptcy or liquidation; secondly it also increases the conflict between shareholders and debt holders. As a consequence these agency costs lead to higher interest expenses to compensate debt holders of the risk. Therefore, capital structure is found to be having both influence on profitability and

riskiness of a company where an increase of leverage at a low level will enhance managers productivity and reduce the total agency costs but only up to a point where the total agency costs of outside debt overwhelm those of outside equity. These theories illustrate the presence of an optimal level of composition of debt and equity from a theoretical point of view.

There have also been studies which tackle the issue investigating empirically the optimal level of mix between debt and equity and finding that the industrial or service sector of operation is an important determinant of level of mix chosen.[8]

Berger and Bonaccorsi di Patti (2006) found that for commercial banks in USA higher leverage translates into higher profit efficiency. While the banking sector raises interest for the banking role as a financial intermediary for monetary policy, the microfinance sub-sector and their institutions raise the same amount of concern and interest. The problem becomes even more significant for developing countries where the microfinance sector, besides being important for the local financial system, is also a tool for poverty eradication. It becomes even more important when considering the shift that many MFIs are having from donor dependency to accessing capital from capital markets.

In fact very few studies have been made outside of big firms of the most developed countries regarding the optimal capital structure of companies in developing countries and different financial and economic environment. Coleman (2007) tried to fill the gap studying the impact of capital structure on the performance of MFIs in Ghana where microfinance institutions were set up through state-run subsidized credit schemes at first, thus developing in private organizations in connection with the capital market. The implications on the capital structure are due to the presence of debt that exerts pressure on management for efficiency, profitability, sustainability and the debt payment obligations. His paper provides an analysis of the capital structure of Ghanaian MFIs and of the impact of their structure on performance.

Coleman uses 52 MFIs in Ghana covering a ten-year period from the formal, semi-formal and informal sector with different clientele base and different geographical location finding high leveraged institutions with a mean debt ratio of 0.76. Most of the debt was long term debt rather than short term.

8 Coleman A. K. , 2007, "The Impact Of Capital Structure On The Performance Of Microfinance Institutions", The Journal of Risk Finance, pp. 59-60

After noticing the highly leverage status of Ghanaian MFIs, he finds that debt has a positive impact on performance and the high leverage is positively related to the outreach. Coleman defines outreach differently from most of what MFIs do: instead of counting the total clientele he defines at outreach the annual change in the customer base. With this concept in mind his findings suggest that higher leverage causes a bigger expansion of the clientele base and therefore a higher premium which translates in an increased profitability for the institution and that can be further used to service the debt. Furthermore his results show that highly leveraged MFIs perform better in the reduction of annual default rates suggesting the reduction of agency costs which encourage the management to put in place measures and practices in order to improve the MFI profitability and to be able to pay its debt obligations. Finally Coleman finds that highly leveraged MFIs enjoy scale of economies and thus they are in a better position to deal with moral hazard and adverse selection.

Coleman confirms that highly leveraged MFIs, and not only firms from other sectors, enjoy some benefits in their operations beside the use of the tax shield proposed by Modigliani and Miller. However microfinance institutions should pay attention to the limit to which they can stretch their debt in order to avoid the increase of agency costs and the danger of financial distress.

2.5.2 Financial sustainability

Research in the field of sustainability has blossomed from this century since when more attention has been given to the long term aspect of microfinance which can widespread around developing countries only if lending to the poor is proven to be sustainable. With all the publicity around microfinance it may be surprising to learn that not all the MFIs are sustainable and able to return a profit. Despite rapid growth and operations based on theoretical platforms (group lending, dynamic incentives, frequent repayments) a large number of MFIs still rely on donations and grants to be able to operate. Even though it sometimes relies on subsidies, microfinance still remains the most cost effective way to alleviate poverty in developing countries.

Although sustainability does not hold as a rule yet, once it became of common knowledge that some institutions found a way to address poverty in a sustainable way, researchers took more interest in studying the effects and the factors that make a microfinance institutions financially sustainable and thus able to have a bigger outreach by lending to several more people.

However scholars have not agreed yet on a common way to calculate and define financial sustainability. Among the different studies presented to the scientific community, they always used different methods across their works which are here presented and described.

One of the first studies to empirically focus on the issue was made by Adongo and Stork (2005) who looked at the factors that influence financial sustainability of formal MFIs in Namibia in order to facilitate decisions at government level to enhance the efficiency and effects of microfinance in the African country. For these reasons they leave out informal MFIs not registered by the national financial authority, thus leaving out a part of the institutions that work in the sector of providing financial services such as independent NGOs that work in Namibia. The decision to focus on financial sustainability was given by the idea that only independent financially sustainable MFIs will be able to achieve the wide outreach necessary to obtain the highest possible level of impact on the target population without the help of donors or governments.

They use the residual, break-even, interest rate to represent financial sustainability given by the Usury Act maximum rate allowed and the break even interest rate required by the MFI to achieve sustainability. This last interest rate envisions that a financially sustainable MFI will need to cover its costs and risk provisions from the interest income that it generates.

The method utilized to define the financial sustainability might be questionable because it assumes that a MFI generates only income from interest on loans. In fact other studies demonstrated that in average MFIs do earn only 90% of their revenues from loan portfolio related activities (interest, fees) whilst the remaining 10% is generated from other activities (Gonzalez 2007). According to their method, their findings suggest the non-sustainability of the Namibian MFIs mostly due to the ceiling to which MFIs are subjected by the Usury Act made for the local commercial banks.

Although the significant signs of activity of Namibian institutions, the non-sustainability occurs because the break-even rate to be financially sustainable is always higher than the ceiling rate imposed by law by the Usury Act which is around 30% in Namibia.

In order for Namibian MFIs to reach financial sustainability, Adongo and Stork do not suggest the option of raising the ceiling which has also an option to protect borrowers from too much high interest rate. As a replacement for the amendment of the Usury Act, they explain the possible alternatives to be found in a reduction of costs, an increase of size of loans disbursed to

their clients without compromising the loan portfolio and/or try to reduce at the same time the default rate.

Nonetheless, they also find that sustainability is negatively affected by the status of the institution: in particular multi-cooperatives joining together are found to be less sustainable. They partly attribute the high degree of non-sustainability to the fact that those types of institutions were the only ones to provide both financial and non-financial data and they do not separate costs of providing these two different kinds of services.

A further positive relationship has been found between financial sustainability and the donor involvement in providing start up funds to MFIs, although the aim of the institution should eventually be sustainability independently of external subsidies and donations, either from private donors, organizations or government. As opposed to the theoretically posited relationship between group lending and sustainability, empirical results showed that institutions lending to groups are less likely to be sustainable than those lending to individuals suggesting that in order to reduce default rates group lending strategies can be complemented by the introduction or improvement of risk and management tools.

In addition Adongo and Stork have found that lower per capita income does not influence the sustainability of MFIs. Besides the importance of the individual MFI's ownership, structure and control, researchers find as a valuable criterion the good governance by the public that should report and control the Namibian MFIs activities and results monitoring their progress towards reaching financial sustainability.

The importance of the previously discussed capital structure of the MFI has been analysed in connection with the financial sustainability by Bogan, Johnson & Mhlanga (2007).

Just as previous studies showed (Berger and Bonaccorsi Di Patti, 2006, and Coleman 2007) they do not see the applicability of the Miller and Modigliani theorem stating that corporate firm differs substantially from a microfinance institution and they also find differences with traditional financial services companies such as banks in the developed world. Those differences have been identified in the extension of the market, the sizes of the loans provided and the different maturities. MFIs rely on social sanction and future denial of credit in order as a substitution to the traditional form of collateral which are not applied to micro-loans. The maturity of micro-loans can vary form 3 to 12 months and the average loan size changes from

USD 50 to USD 1500. Due to the small size of loans, the loan servicing process in the microfinance sector becomes a labour intensive work creating high transaction costs.

With this difference in mind, Bogan et al. (2007) take an empirically approach to examine the MFIs capital structures and identify the difference that make them sustainable.

Their study consists in the empirical analyses of the 300 biggest MFIs of the world by total assets divided by regions. As opposed to Adongo and Stork (2005) they use the operational self-sufficiency data to extrapolate unilaterally the financial self-sufficiency independently from the country of operation of the MFIs. If a MFI results to have 110% operational self-sufficiency, then it is also financially sustainable. This approach does not consider the cost of capital that a MFI should incur or more precisely it corrects the operational self-sufficiency in a arbitrary way irrespective of the country where the MFI operates. The different level of inflation and lending rates in the countries are not taken into account.

They test and analyse the theory of "life-cycle" of lending institutions which are assumed to and generally start their operations with grants and soft loans in the formative stages of the institution turning to private debt capital as they mature. In the last stage those MFIs which have the possibility, might decide to finance themselves with equity capital when becoming available. They notice how the cycle suggests MFIs accessing also deposits collection and commercial debt in order to finance future growth of the institution.

The results are interesting: they noticed that the age of MFIs do not influence the sustainability of MFIs. On the other hand they find the importance of capital structure and funding instruments of these institutions. In particular they discover that the size of MFIs assets and capital structure are associated with sustainability. The ratio of debt relative to assets is found to be negatively related to financial sustainability. Moreover grants are found to hinder the development of MFIs into competitive, efficient and sustainable operations having been found to be negatively related to the sustainability of MFIs.

Many donor organizations realized this latter aspect and they started to reduce grants to MFIs which are pushed to adopt a commercial orientation in order to scale up their loan portfolios, increase efficiency and sustainability and lowering lending rates. However in order to meet these new capital demands, researchers address the need of innovative financing. Among other factors analysed, no regional differences have been found among the five sub-continents

analysed; at the same way there is no influence for the sustainability regarding the legal status and for the kind of lending (individual or group) chosen by the MFI.

By starting from the concept that delivering financial services to the poor is comparatively costly and difficult, Woller and Schreiner (2001) analyse the relationship between outreach and financial sustainability. They notice a complex, multidimensional relationship that depends on several factors, both direct and indirect identifying that the relationship between depth of outreach and financial self-sufficiency will depend on the way in which all these factors interact with each other. They attempt to find a possible relationship through an empirical study around thirteen village banks.

Woller and Schreiner find that interest rates, administrative efficiency, loan officer productivity and staff salaries are determinants of financial self-sufficiency and they try to compare them with the a part of the microfinance literature which suggests how to achieve self-sufficiency:

1. Drive down administrative and per unit output costs (as measured by loans or borrowers)
2. Drive up staff productivity
3. Achieve significant scale
4. Charge appropriate high interest rates

In accordance to those practices, results show that those village banks with lower administrative costs, higher loan officer productivity, higher interest rates and lower average salaries are positively associated with financial sustainability. However contrary to those practices, there are no other significant staff productivity measures to have a positively association with sustainability. These findings suggest that MFIs management should rather focus on maximizing the number of clients per officer or reducing the average staff salary.

Although the small scale of the study, another contradicting and surprising finding is the absence of influence in the number of borrowers in terms of financial sustainability.

Probably, the most notable finding of Woller and Schreiner is the inverse relationship between average loan size to GNP and financial self-sufficiency suggesting that providing small loans to the poorest is possible and can be financially sustainable.

A recent study made by Caudill, Gropper and Hartarska (2009) does not focus directly on financial sustainability. Their main focus is testing empirically whether the age of institution

affects the cost efficiency of MFIs overtime. Empirical results do not suggest that MFIs generally operate at lower cost overtime. Their study becomes relevant for the some of the factors that are associated with cost improvements. Firstly institutions that do not rely on subsidies improve cost-wise overtime, just as the collection of deposits has a positive effect to the future cost structure of the institution.

Moreover the difference in the geographical difference of MFIs pointed at a higher likeliness for Central Asia institutions compared to those from Eastern Europe for reasons that have not been explained by the variables examined such as difference in population density, economic growth rates or other economic measures.

The matter of regulation and the MFI legal status has not been studied widely and for that reason Hartarska and Nadolnyak (2007) analyse whether the regulation of MFI affects the outreach and the sustainability of the institution. In their empirical research of 114 MFIs distributed in 62 countries, the researchers investigate whether MFI performance is influenced by the regulation, macroeconomic and institutional variables.

Results show that the legal status of the microfinance institutions does not affect either sustainability or outreach. MFIs might not have any substantial advantage in becoming regulated if indirect effects are not counted. In fact benefits from the regulation might come from the access to savings collection by the institution which in turn takes to better outreach. In many of the countries in order to collect savings, a banking licence and therefore regulation is mandatory by law. The most surprising result is that less leveraged MFIs are to be found more sustainable in contradiction with the theory of capital structure which suggests that a high level of leverage for corporate firms (Miller and Modigliani 1963) and for MFIs (Coleman 2007) results in them being more efficient and profitable.

Cull et al. (2007) explored patterns of profitability, loan repayment and cost reduction among a sample of MFIs in about 50 countries by starting from the claim that microfinance promises to reduce poverty in low-income communities by using a profit-making attitude and practices and without the ongoing use of subsidies. He finds that about half of the sample institutions to be profitable and others approaching almost profitability and financial sustainability. Moreover he noticed that individual-based lenders performed better than group-based lenders.

Later on Cull et al. (2009) analyzed different aspects of the microfinance institutions especially considering their different legal status. NGOs and banks are compared in the study giving an explanation of the different motives, capital structure, operational costs and efficiencies. In regards to sustainability they do not find that the average cost per loan influence their financial self-sufficiency.

3. METHODOLOGY

The aim of the empirical study is to understand why some microfinance institutions are more financially sustainable than others. The empirical approach attempts to identify the differences and the influence that each variable taken in consideration has on the MFI sustainability. In order to achieve the presented goal and find those parameters the software SAS 9.2 has been used to find the regression model.

Before moving on with the description of the model and the variable used for the regression, the discussion on the data and their characteristics is made to illustrate what sample data the study is based on, its quality and to compare those data with those found in the previous studies to discuss a possible change in trends within the microfinance industry.

3.1 Data

MixMarket is a not-for-profit private organisation that aims to promote information exchange in the microfinance industry. Although the number of institutions is way higher, MixMarket lists over 1800 MFIs with data from this century, adding new institutions to its database every year. The list comprehends institutions of different size, country and legal status regardless of their regulation, their lending method and whether they offer additional financial services to personal or business loans.

Out of those 1800 MFIs, 687 MFIs have been selected as a sample for the current study. The year chosen for the study is 2008 which results to be the year with more and complete data available. However due to few calculations needed, only institutions with both data from 2007 and 2008 have been selected. Besides the important variable of the year, the institutions were selected based on the presence, quality and reliability of the data necessary to perform the study. The data set does not represent all microfinance institutions but they serve a large fraction of the institutions worldwide especially in terms of assets, gross loan portfolio and outreach through the number of worldwide clients served.

In this respect the skewed size distribution of microfinance is given by an analysis by Cull et al. (2007) which indicates that the top 30 MFIs account for 90% of the clients served by the first 234 MFIs. This data reassures the fact the most of the clients are indeed included in the study. Although MixMarket does not include all the microfinance institutions present in the world, they often are encouraged to disclose their financial data to the organization by their

microfinance networks which in turn results in the widest source of data available with the confidence that the largest MFIs are represented.

From the variables point of view, the study has considered both macroeconomic and microeconomic parameters to show the influence they have on financial self-sufficiency.

MixMarket offers to the public a wide choice of data both in local currency and USD among which the following can be extracted and used for research:

1. Profile data: they describe the general profile of the institution (name, country, date of establishment, etc.)
2. Indicators: they show the number of personnel, the MFI financing structure and ratios, outreach such as number of borrowers and their gender and performance parameters such as return on assets and on equity.
3. Products and clients: they indicate the number of loans and borrowers divided by their lending method (individual or group) and their lending area (urban, rural)
4. Balance sheet: they show parameters of a standardized balance sheet for MFIs with their liabilities and equities together with donations received.
5. Income statement: they show parameters of a standardized income statement for MFIs with detailed source of income and expenses made.
6. Portfolio Report: these data show write offs and impairment losses.

All together parameters available are over 90, each of them is grouped in one of the items above. However for the purpose of the study a screening has been done for the following reasons:

1. Presence of actual data: although parameters are present for MFIs to provide data, it does not mean that the MFI has been able to provide them for a substantial number of institutions. Moreover some institutions did not supply data for the year 2007 or 2008. For this reason, some minor parameters have not been selected in order to have a reasonably large number of MFIs.
2. Similar parameters: some data are very similar to each other and they would have shown high autocorrelation.
3. Irrelevance: many balance sheet and income statement parameters are irrelevant to the study and they would not offer any relevant economic meaning.

4. Missing data for macroeconomic variables: some inflation and lending rates published by the statistics branch of the International Monetary Fund did not include some countries which have not been included in the study. However 63 countries from around the world have been included.

Although MixMarket has been the primary source of information due to its widest selection of institutions data, especially for microeconomic variables and financial data, it has not been the only data source. Macroeconomic variables such as inflation and lending rates are more common and widely available and they have been provided by the statistics branch of the International Monetary Fund (IMF) as previously mentioned.

The analysis of the sample data and the specific characteristics of the MFIs chosen can be seen in the following tables.

Microfinance institutions have been divided in six groups as it is illustrated in Table 4. Non-Governmental Organizations (NGOs) represent the most common legal system setup in order to establish a MFI followed by non bank financial institution that are generally allowed only to disburse loans and have lower capital requirements but they cannot raise savings from the public. In fact, depending on the local country legislation, it might be required a licence from the national bank in order to raise savings or provide other financial services other than offering loans.

Type of institution	**N. MFIs**
Non Bank Financial Institution	227
NGO	245
Bank	63
Rural Bank	42
Credit Union Cooperative	109
Others	1

Table 4 - Type of institution

As NGOs do not take deposits either, one can notice that most of the institutions analysed are specialised in offering loans and they do not take deposits.

Loan Portfolio in 2008	N. MFIs
< 1M	105
1M - 2M	79
2M - 5M	131
5M - 10M	108
10M - 20M	75
20M - 50M	87
50M - 100M	35
> 100M	67

Table 5 - MFIs Loan portfolio in 2008

The total loan portfolio of the studied MFIs was about 30 billion in 2008 (see Table 5) which is 10 billion lower than the assets registered by the same institutions in the same period (see Table 6).

Total assets 2008	N Obs.
< 1M	81
1M-2M	65
2M-5M	127
5M-10M	119
10M-20M	84
20M-50M	84
50M-100M	48
> 100M	78

Table 6 - Total assets in 2008

Previous studies (Gonzales, 2007 and CGAP Occasional Paper No. 15) showed that scale advantage is not very important for MFIs and disappears after 2000 clients. After that point MFIs gain very little from scale economies. One of the possibilities is the nature of the microfinance industry which is labour intensive and staff salaries make up for most of the operating costs, in addition to relatively low fixed costs in comparison with variable costs.

There are 141 MFIs with less than 2000 clients which serve about 100.000 clients representing 20% of the MFIs studied but only 0.17% of the total clients served by all the 687 MFIs (see Table 7).

Borrowers	Institutions	Total borrowers
< 2.000	141	100.188
2.000 - 10.000	167	864.060
10.000 - 50.000	230	5.217.888
50.000 - 100.000	74	5.229.691
100.000 - 500.000	58	11.750.570
> 500.000	17	35.414.395
Total	**687**	**58.576.792**

Table 7 – Number of borrowers in 2008

Another important data that can be found is that the biggest 17 MFIs together serve more than 35 millions clients out of the 58 millions (60%) served by the total 687 MFIs. Among these institutions we find also institutions that are largely discussed in the microfinance industry such as BRAC, Grameen Bank, ASA, SKS and Compartamos. In this occasion the scale of operations at least in terms of borrowers can help the financial sustainability as the FSS measured for the institutions ranges from 0.96 of Grameen Bank to 1.66 of Compartamos which indicates almost complete sustainability for those big institutions with the only exceptions of two of them (ACSI and SKDRDP) which still had equity subsidies in their balance sheet in 2008.

When looking at the regional provenience of the big institutions it is curious to find them divided as follows: 6 Indians, 3 from Bangladesh (9 South-East Asian), 5 Latin American (of which 3 Mexicans) and 3 Africans with the total absence of MFIs with more than 500.000 clients in the regions of “Eastern Europe and Central Asia” and “North Africa and Middle East”.

In Bangladesh the major three MFIs served in 2008 about 18.5 million people or 11% of the national population becoming an important source of credit in the country. In Mexico that counts a population of about 108 million, the clients served by the first 3 MFIs are about 3.1 millions or 2.8% of the national population. In India, where the situation is more fragmented with several MFIs present in the country, the biggest MFIs serve about 10 million clients. This data suggest that some countries are making of microfinance a part of the economy which can compete with traditional banking services.

Donations are another important factor which characterise MFIs especially in their initial stage. Some of them manage to move away from donations after some years, others continue to rely on them because of the nature of the institution which decide to pursue their initial social mission.

Donated Equity	Institutions	Total donated equity	MFIs with FSS>1
0	447	0	45%
0 - 100.000	61	2.005.674	54%
100.000 - 500.000	57	15.273.944	33%
500.000 - 2.000.000	75	81.553.917	29%
> 2.000.000	47	324.548.816	30%
Total	687	423.382.351	42%

Table 8 - Donated Equity in 2008

In the analysis of donations, it is visible that about 65% of MFIs did not receive any donations and among them 45% reached full financial self-sufficiency (FSS) against a total average of 42%. It is curious to notice that the higher the amount of donations, the lower is the probability that an institution will be sustainable. The highest correlation has been showed by those MFIs which received a significantly small amount of donated equities.

As a whole the total amount of equities donated to the 687 MFIs has been USD 423 million out of almost USD 7 billion USD in equities averaging 6% of total equities.

The geographical composition of MFIs which have been groped in five regions suggest a more numerous presence of MFIs in Asia and Latin America as also confirmed by the previous analysis of borrowers and of MFIs with a bigger outreach.

Capital/Asset ratio	Total MFIs	Africa	Eastern Europe and Central Asia	Latin America and The Caribbean	Middle East and North Africa	South East Asia and The Pacific
0.00 – 0.10	90	2	33	17	1	37
0.10 – 0.20	207	13	50	66	4	74
0.20 – 0.40	210	25	67	78	6	34
0.40 – 0.60	107	18	24	51	6	8
0.60 – 0.80	30	4	6	13	4	3
0.80 – 1.00	43	2	16	16	6	3
TOTAL	**687**	**64**	**196**	**241**	**27**	**159**

Table 9 - Geographical composition of MFIs and their capital structure

The majority of MFIs belong to the Latin American region, followed by the Eastern Europe and Central Asia region and the South East Asia and the Pacific region. African and Middle East MFIs count together for about 13% of all the observations.

It can be noticed that the sample reflects quite well the whole population of MFIs whose presence is more widespread in Latin America and Asia. Mixmarket accepts the presence from all the countries in the world and it can be observed that MFIs from developed countries are very rarely present; this is due to the developed banking system that they generally have which leaves fewer people with no access to credit.

Regarding the MFIs capital structure, data show a mean capital asset/ratio is 0.304 with a median of 0.2266 (see Table 10). Thus the mean debt ratio of 0.696 in slightly lower than the one obtained by Coleman (2007) when the mean debt ratio was 0.76 for 52 Ghanaian MFIs studied.

However the institution's region of operation seems to influence its capital structure. Table 10 shows how 70% of South-East Asia and the Pacific MFIs manage to have a debt ratio over 0.80 against a total average of 43%. African and Middle-East MFIs do worse than average with 23% and 19% suggesting a low leverage of those MFIs due to lack of investments or capital to be borrowed to improve the institution outreach.

Capital / Asset ratio	Total MFIs	Africa	Eastern Europe and Central Asia	Latin America and The Caribbean	Middle East and North Africa	South East Asia and The Pacific
0.00 - 0.10	13%	3%	17%	7%	4%	23%
0.10 - 0.20	30%	20%	26%	27%	15%	47%
0.20 - 0.40	31%	39%	34%	32%	22%	21%
0.40 - 0.60	16%	28%	12%	21%	22%	5%
0.60 - 0.80	4%	6%	3%	5%	15%	2%
0.80 - 1.00	6%	3%	8%	7%	22%	2%

Table 10 – Percentage of regional institutions divided by capital structure

The benefits from leveraging have been previously discussed mentioning trade-off theory and capital structure studies. According to these studies, theoretically South East Asian MFIs with a mean debt ratio of 0.80 and only 9% of its institutions having a ratio below 0.60 are in a

better position to increase profitability and achieve sustainability. The table offers the chance to evaluate the differences in capital structure and their deviation from the total average giving an input to analyse the reasons of the divergence which could be legislative or given by the regional economic situation.

Following the analysis of the capital structure of the institutions studied we pass on to the data concerning the sustainability of MFIs. Out of the total of 687 MFIs represented in the study, 80% of them reached the first stage of sustainability expressed by the operational self-sufficiency (OSS > 1), whilst only about half of them (42%) managed to reach financially self-sufficiency (FSS > 1). Although the median for MFIs' OSS is 1.18 (average = 1.15), MFIs show that the path towards full and long term sustainability is very close as the median is 0.94 (average = 0.95).

There are many MFIs that are not yet financially sustainable but with few adjustments to their practices at a management level can easily make the further step to the second level of sustainability. In fact 15% of MFIs have a FSS between 0.80 e 0.90 and another 15% have a FSS between 0.90 and 1 which are the ones that have the higher probability to be promoted as financially sustainable increasing the percentage of sustainable MFIs to 72% of the sampled institutions.

	World MFIs		Africa		Eastern Europe and Central Asia		Latin America and The Caribbean		Middle East and North Africa		South East Asia and The Pacific	
	FSS	OSS	FSS	OSS	FSS	OSS	FSS	OSS	FSS	OSS	FSS	OSS
< 0.70	114	42	19	7	38	9	34	15	5	1	18	10
0.70 - 0.80	78	24	12	5	19	4	33	10	5	0	9	5
0.80 - 0.90	104	21	8	5	32	8	45	5	5	0	14	3
0.90 - 1.00	103	51	5	6	28	16	39	21	5	2	26	6
1.00 - 1.10	110	137	7	9	24	32	38	54	3	2	38	40
1.10 - 1.20	84	132	6	7	17	32	29	51	2	4	30	38
> 1.20	94	280	7	25	38	95	23	85	2	18	24	57
TOTAL	**687**	**687**	**64**	**64**	**196**	**196**	**241**	**241**	**27**	**27**	**159**	**159**
Sustainable MFIs	42%	80%	31%	64%	40%	81%	37%	79%	26%	89%	58%	85%

Table 11 – Operational and Financial Self-sufficiency of MFIs.

Such a difference between the two types of sustainability is given by the high cost of capital to which MFIs have incurred in given the considerably high amount of concessional loans and the effect of highly inflated countries that eroded part of the equities.

The strength of South-East Asian MFIs has been the capability to lose less capital compared to those of other regions not only for macroeconomic factors outside of MFIs control but especially by the high leverage adopted through debt and deposit collections. Less leveraged MFIs in Africa are also the ones that find it more difficult to reach sustainability also for a more difficult environment to access credit.

Following an analysis of statistical data from the institutions used for the study, the focus switches to the variables which have been used for the regression analysis. The parameters chosen before the necessary adjustments have been the following for the year 2008:

1. Inflation rate: it indicates the inflation rate for the selected countries.
2. Lending rate: it indicates the annual lending rate for each country defined as bank lending rates which usually meet the short-and medium-term financing needs of the private sector. These rates are normally differentiated according to creditworthiness of borrowers and objectives of financing.
3. Capital / Asset Ratio: calculated as Total Equity / Total Assets. It specifies the capital structure of the MFI which has been found significant for sustainability in previous studies (Bogan, Johnson & Mhlangay, 2007).
4. Deposits to Total Assets: calculated as Deposits / Total Assets. The presence of different country regulation and the institution legal status might or might not allow the possibility for a MFI to receive deposits from borrowers.
5. Operational Self-Sufficiency (%): calculated as Financial Revenue / (Financial Expense + Impairment Loss + Operating Expense). Mixmarket represents this value which is used as the starting point to calculate financial self-sufficiency (FSS). It shows the possibility of an institution to cover its operating expenses, cost of financing and impairment losses with its operating revenues.
6. Operating Expense / Assets (%): calculated as Operating Expense / Average of Total Assets.

7. Portfolio at Risk > 90 days Ratio (%) calculated as Portfolio at Risk > 90 days / Gross Loan Portfolio. PAR is a very important measure for risk and performance evaluation of a MFI. As indicated by the above formula it puts into relation the outstanding balance of loans which are late with the overall portfolio. PAR is not to be considered a measure of default but it simply provides an alert of how risky the portfolio is and that loans might not be repaid in full. Moreover according to the kind of institution and the country of operation, PAR figures can be affected by seasonality: holiday periods and months where school fees are to be paid are the more difficult for institutions which find it difficult to collect the amounts due during these time periods. It does differ from the loan loss provision as it is expected that a part of the portfolio at risk will be repaid by borrowers. It is important for a well-performing MFI to keep PAR below a value of 5% and a bell should ring when it reaches 10%.
8. Non-earning liquid assets as a % of total assets: calculates as Non-earning liquid assets / Total Assets. It measures which part of the assets are not earning revenues because they are not lent to the MFIs clients without the possibility to generate an income.
9. Yield on Gross Portfolio (nominal) (%): calculated as Interest and Fees on Loan Portfolio/ Average of Gross Loan Portfolio. It gives an indication of the return on the loan activity generated from revenues from interest and fees.

Regional dummies: MFIs have been grouped in five regions which are Africa, Eastern Europe and Central Asia, South-East Asia, Latin America and Middle East.

The above data is reviewed and cross-checked by Mixmarket in order to standardize different information gathered to international financial reporting norms. Although some MFIs do not include further information but the one asked by the organisation, most MFIs include audited financial statements to prove truth of provided information. Annual lending and inflation rates have been otherwise gathered by the IMF whose data can be considered reliable for the study.

3.1.1 Data adjustments.

Although the data analysed are only from the year 2008, as it will be explained below in more details, few small adjustments have been necessary to calculate the dependent variable of

the model including some data from 2007. In particular in order to calculate the cost of capital, some averages have been calculated using the ending data of 2007 and 2008. The adjustments have been necessary for averages of equity and assets. For the mentioned reason only MFIs with data from both 2007 and 2008 have been included in the study in order to have consistent data for the dependent variable estimation.

3.1.2 Financial self-sufficiency

Among the data available on Mix Market financially self-sufficiency (FSS) is not provided. The importance to have this data available is at the basis of this research as it will be the dependent variable in the regression model. In this respect the World Bank published a Microfinance Handbook that comes to hand to calculate a value for each institution that takes into consideration their cost of equity and cost of debt in case a particular institution had access to loans at below market rates (concessional loans).

The formula for the calculation used to obtain FSS is therefore:

Financial self-sufficiency (FSS) = Operating income / (Operating expenses + Financing costs + Provision for loan losses + Cost of Capital)

The income from operations is therefore compared to the sum all the costs incurred by the MFI (both operational and costs for financing); operational costs comprehend all those expenses related to operations such as personnel costs, rent, utilities, transportation, office supplies and depreciation. In addition to those costs, a provision for loan losses is calculated as a percentage of the value of the Gross Loan Portfolio that is at risk of default and is added to the cost of capital which is rarely considered in these studies and computations. Unless 100% of FSS is reached, the provision of financial services by the MFI is at stake as it would need to rely on donor funding to continue their operations.

The challenge is to find reliable data to be able to find the cost of capital which is calculated as follows:

Cost of capital = (inflation rate (or market rate of equity) x (average equity – average fixed assets) + (average funding liabilities x market rate of debt) – (actual financing costs)

The cost of capital becomes essential considering that MFIs have different sources of capital with different interest rates, different capital structure and different access to debt.

The first part of the formula calculates the impact of equity on inflation. From the average equities (that might change during the year in consideration), average fixed assets are subtracted because they are assumed to appreciate at least at the inflation rate.

The second part of the formula calculates the impact of the MFIs access to financing at below market rates. This part of the formula has from one side the financing costs that the MFI would have occurred if they would have accessed debt at market rates; on the other side the actual financing costs that the MFI incurred in. The result of this second part of the formula will be 0 in case that the MFI borrowed all its debt at a market rate.

3.2 Model

The regression model used for the study has the following variables which have previously been explained in details:

$Yi = \beta 0 + \beta 1\ X1i + \beta 2X2i + \beta 3X3i + \beta 4X4i + \beta 5X5i + \beta 6X6i + \beta 7X7i + \beta 8X8i + \beta 9X9i + \beta 10D10i + \beta 11D11i + \beta 12D12i + \beta 13D13i + \beta 14D14i + ui$ where:

Y = Financial Self-sufficiency (FSS)
β0 = intercept
X1= Inflation rate
X2= Lending rate
X3= Capital / Assets ratio
X4= Deposits to total assets
X5= Operational self-sufficiency (OSS)
X6= Operating expense / assets
X7= Portfolio at risk > 90 days
X8= Non earning liquid assets as percentage of total asstes
X9= Yield on gross portfolio (nominal)
D10= Africa dummy
D11= Central Asia dummy
D12= Middle East dummy
D13= Latin America dummy
D14= Outlier dummy

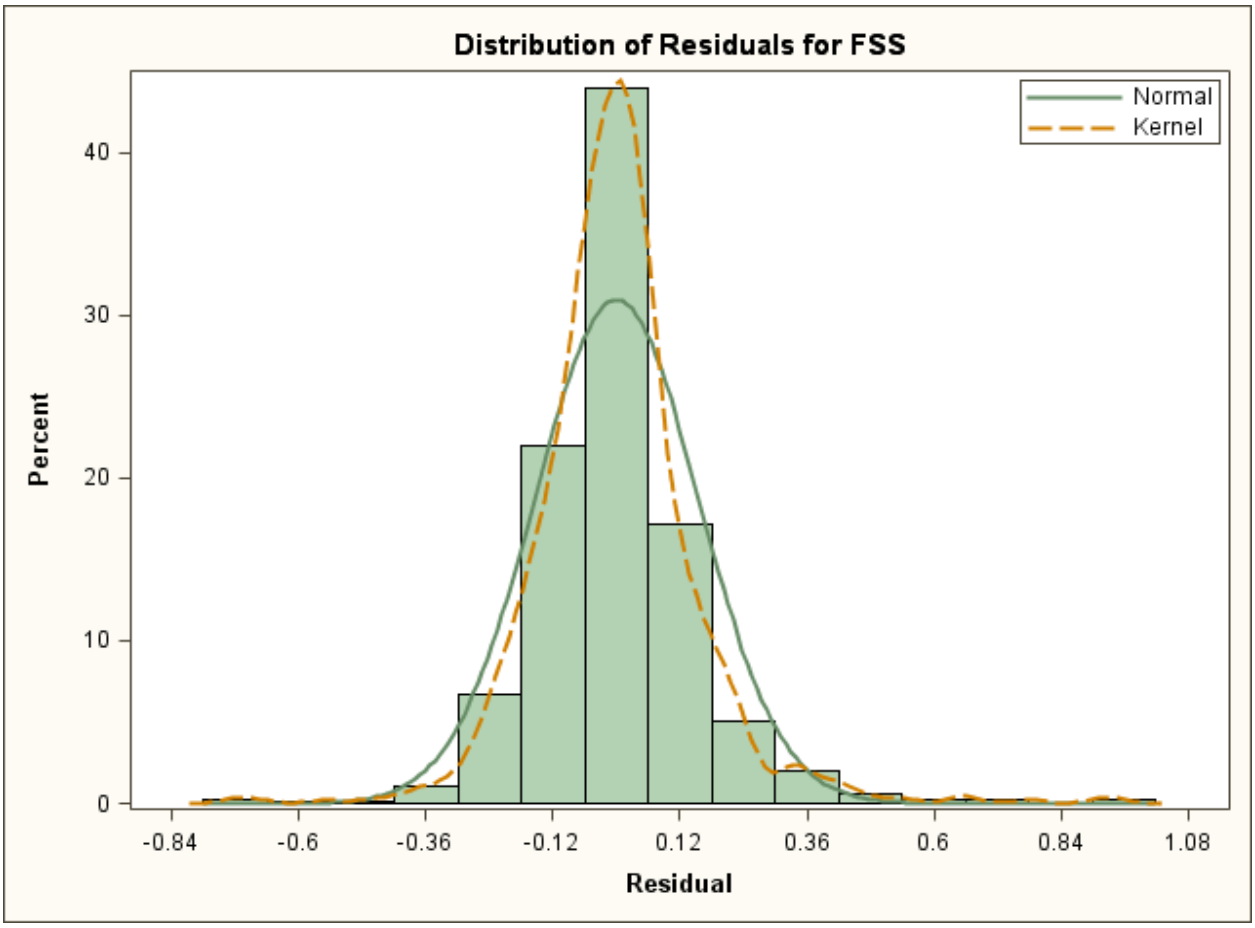
u = error term

The regression model with the intercept comprehends nine quantitative variables indicated by the letter X in the model and five dummy variables which are indicated by the letter D.

There is one dummy (D14) which considers a clear outlier, whilst the other dummies used indicate the region where the MFI has its operations; the region omitted and to which regional dummies are compared is South-East Asia.

3.3 Model quality.

In order to define the quality of the model different tests have been performed to find whether the model presents some heteroscedasticity, errors of specification and/or normality.



Graph 1 - Distribution of residuals.

Whilst normality distribution might not be found in small samples, the significant amount of observations gives enough confidence in the result. Initially we focus on the assumption of normality of residuals being normally distributed by analysing them both graphically and numerically. The first approach used is to represent graphically a histogram of residuals which is draw below.

By dividing residuals into suitable ranges, it is possible to add to each rectangle the amount of observations of the residuals. The distribution is around the value 0 is the most common in the sample and the bell-shape of the residuals indicates the normality of distribution of residuals.

Although the graphically method suggests normal distribution, the numerical tests do not confirm the same conclusion.

In the Anderson-Darling the underlying null hypothesis is that the variable is normally distributed. The A – square of the test is 10.63748 (see Table 12) with a very low p-value that implies the rejection of the assumption of residuals being normally distributed.

Tests for Normality				
Test	**Statistic**		**p Value**	
Anderson-Darling	**A-Sq**	10.63748	**Pr > A-Sq**	<0.0050

Table 12 – Anderson-Darling normality test

Although the mean around 0 seems evident, residuals distribute themselves around the mean forming longer tails and residuals quite far away from the mean than a normal distribution suggests. Graphically it does not seem a skewness problem to one of the sides but more a kurtosis issue with a high peak at the mean value of 0 and long tails away from it. If residuals are not normally distributed, there is the possibility that either the dependent variable (FSS) or at least one explanatory variable may have the wrong functional form or an important variable might be missing from the model. The consequences are important when using residuals for other tests derived from the normal distribution such as t-tests, F-tests and chi square tests. However the issue of the residuals not being normally distributed is not uncommon when working with financial data sets and additionally the high number of observations (687) do not make it too critical to have residuals not normally distributed.

A second assumption for the linear regression model is that the disturbances appearing in the population regression are homoscedastic; that is, they all present the same variance. Heteroscedasticity can arise for the following reasons:

1. As a result of the presence of outliers. An outlier is an observation that is very different (small or large) from the other observations in the sample. Even though the effect is more evident in small samples, the presence of outliers can alter the results and conclusions of the regression analysis.
2. The violation of the assumption of correct specification of the model. Some important variables might be omitted from the model. If in the financial sustainability, some important variables were omitted a possible consequent result might be the presence of heteroscedasticity.
3. The skewness in the distribution of one or more regressors that have been included in he model.
4. Incorrect data transformation and incorrect functional form (linear versus log-linear formats).

The first step to eliminate heteroscedasticity has been taken by inserting a dummy variable (D14) which represented a clear outlier in the model and could have influenced the homoscedasticity of the considered model. The institution which has been removed is a Kenyan institution (Micro Africa) that resulted to have jumped from having an operational self-sufficiency of 103% in 2007 to 521% in 2008. More importantly their capital/asset ratio jumped from 15% to 67% in the same year period suggesting an injection of capital resulting also from their balance sheet where USD 4 million of debt in 2007 has been put in equity reserves the following year. The anomaly that caused a problem in the model is also not common in reality as one of the explanations is that a former regular debt has been transformed in a donation or subsidy for Micro Africa operations. More probably the creditor of the MFI's debt has become shareholder.

Following the removal of one clear outlier, in order to detect additional signs of heteroscedasticity few numerical tests have been adopted:

White's test. The general test of heteroscedasticity proposed by White does not rely on the normality assumption which has not been confirmed by the previous test of detection of normality (Anderson Darling test). One of the problems with the test is the exponential use of

degree of freedoms used by the test for each of the regressors because it is made by making cross products among regressors. The substantially high number of observations (687) of the sample minimise the mentioned problem giving a significant number of degree of freedom to be used (the method consumed 95 degrees of freedom due to the many variables in the model).

Breusch – Pagan – Godfrey test. This test, just as Goldfeld - Quandt test, assumes a normality distribution of residuals. Unfortunately it does not happen in our case but it still remains a point of confirmation that heteroscedasticity is present in the model specified. Differently form the Goldfeld – Quandt test, this method does not need the identification of the assumed heteroscedastic variable.

The results of the two mentioned tests executed to find the presence of heteroscedasticity are shown in Table 13 below:

Equation	Test	Statistic	DF	Pr > ChiSq
FSS	White's Test	135.8	95	0.0039
	Breusch-Pagan	25.75	14	0.0278

Table 13 – White's and Breusch-Pagan-Godfrey's heteroscedasticity tests

The chi square value obtained in the White's test is 135.8 and it exceeds the value with 29 degrees of freedom at 5% level of 45.7222 not being able to reject the null hypothesis of no heteroscedasticity. The conclusion according this first test is the presence of heteroscedasticity. The result given by the Breusch Pagan Godfrey test is coherent with the previous one: the chi square value of 25.75 exceeds the critical value at 5% confirming the presence of heteroscedasticity in the specified model.

Therefore there is a violation of the assumption of the classic linear regression that assumes the homoscedasticity of the residuals. As a consequence of not respecting the assumption, heteroscedasticity might cause some problems to the model but for the purpose of the study it has been decided to work with heteroscedasticity as different attempts to change the model have not eliminated the effect but only reduced it in the case of the exclusion of one outlier.

4. RESULTS AND DISCUSSION

After having discussed the quality of the model, its weaknesses and its implications for the study, the focus shifts to the qualitative analysis of the results obtained. Table 14 shows the values of the variables of the model analysed:

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.52470	0.03811	13.77	<.0001
Inflation rate	-0.00734	0.00073668	-9.96	<.0001
Lending rate	-0.00322	0.00083207	-3.87	0.0001
Capital/asset ratio	-0.22819	0.03314	-6.89	<.0001
Deposits to total assets	0.19369	0.02389	8.11	<.0001
Operational self sufficiency	0.46417	0.02474	18.76	<.0001
Operating expense/ assets	-0.55673	0.08431	-6.60	<.0001
Portfolio at risk > 90 days	-0.22665	0.08412	-2.69	0.0072
Non-earning liquid assets as a % of total assets	-0.33766	0.05512	-6.13	<.0001
Yield on gross portfolio (nominal)	0.71596	0.05510	12.99	<.0001
Africa dummy	-0.07229	0.02612	-2.77	0.0058
Central Asia dummy	-0.07161	0.01948	-3.68	0.0003
Middle East dummy	-0.08858	0.03429	-2.58	0.0100
Latin America dummy	-0.06189	0.01843	-3.36	0.0008
Outlier dummy	1.09442	0.18476	5.92	<.0001

Table 14 – Variables values of the econometric model

Initially there will be an analysis for each variable to discuss their statistical significance and their economic meaning followed by a more general discussion of the results of the values as a whole. Finally the variables excluded from the study are mentioned to give a full perspective of those variables that have not been found influential in the institutions' financial sustainability.

4.1 Variable discussion

The first step is to analyse the empirical results from the regression model by discussing one by one each dependent variable, its importance within the model, its value and its significance at the specific confidence level. Moreover an attempt to give an economic interpretation of the sign is presented for each variable to see whether the single results have an explainable and relevant financial and economic meaning. The primary target is to see the influence of each dependent variable against the independent variable which has been used in the study (FSS or financial self–sufficiency) and to evaluate its importance within a microfinance institution. Some of the variables are macroeconomic and they cannot be influenced by MFIs decisions unless it implies the decision of the country of operations (e.g. MFIs deciding to expand in other countries), others are more tangible for MFIs and can instil the idea of concentrating on certain parameters and indicators.

Inflation rate. The different countries where microfinance institutions operate was the starting point for including macroeconomic variables such as the inflation rate to show how the economic situation might affect the sustainability of MFIs. In this case inflation rate has a value of – 9.96, a negative value statistically significant at a 1% level. This is highly expected because the inflation rate is used to calculate the MFIs cost of capital that lowers the financial sustainability. Therefore it is clear that MFIs operating in a low inflation country are more successful in becoming self-sustainable whilst MFIs in high inflated countries find it more difficult. The main reason is to find in the erosion of MFI equities from inflation as higher the inflation is, bigger is the part of equities that loses its value.

Lending rate. A similar discussion to the inflation rate can be done for the second and last macroeconomic variable included in the model which is also used in the calculation of the cost of capital and financial sustainability. The negative value of -3.87 is significant at 1% level which implies that a high lending rate in a country negatively affects the sustainability of the local MFI. It is important to observe that the lending rate used in the formula explained earlier only affects

those institutions in the study that benefited from loans at below market rates. It is clear that a high lending rate will put MFIs in the position to higher their loans interest rate if they wish to be sustainable. Just as for the inflation rate, MFIs operating in countries with interest rate ceilings have less room to higher their interest rate should they wish to pursue sustainability.

Capital / Asset ratio. This capital structure ratio has a negative value of – 6.89 that is significant at 1% level. The economic meaning of the value but especially of the negative sign is confirmed by previous studies where capital structure has been widely studied (Bogan, Johnson & Mhlanga 2007). This result suggests that having a high capital part in the MFI assets might hinder the future financial sustainability of MFIs whilst it would be good for MFIs to finance themselves through debt. However it must be reminded that trade-off theory set a limit to the debt ratio to adopt not to fall into financial distress and the consequent agency costs. The high debt ratio or leverage allows the MFI to be more profitable, thus sustainable and to reach a greater clientele base (Coleman 2007).

Deposits to total assets. The positive value of 8.11 is significant at a 1% level. This positive value is associated with the benefit that institutions such banks have from having lots of deposits from the public. The financial benefit comes from the fact that the interest rate paid on deposits is always cheaper than borrowing from other institutions and at the same time deposits mobilisation can release MFIs from their dependence on donor funds, government subsidies and external credit. Let us remember that below market rates in the study are taking out from consideration with the calculation of the cost of capital. The debt obtained below market rates is adjusted as they were obtained at market rates. Therefore it does not surprise the positive association between the ratio of deposits over total assets and financial sustainability. Beside the financial value of being financed through deposits, and the possibility to be more competitive in the market for offering an additional financial service (for those institutions which do not offer it yet) there is a hidden value that benefit MFIs' customers. This value for MFIs' borrowers and clients is the access to deposit services which especially help the poor to manage emergencies in a better way, meet expected demands such as school fees and take advantage of arising investment opportunities.

Countries with regulated and nonregulated MFIs	Countries where regulated MFIs collect deposits	Countries, where nonregulated MFIs can collect deposits	Countries where regulated MFIs do not necessarily collect deposits
Armenia	Bangladesh	Armenia	Albania
Bosnia and Herzegovina	Bolivia	Cambodia	Bosnia and Herzegovina
Bolivia	Cameroon	Honduras	Benin
Cambodia	Colombia	India	Bolivia
Colombia	Dominican Republic	Kenya	Colombia
Haiti	Ecuador	Mali	Dominican Republic
India	Ethiopia	Mozambique	Egypt
Jordan	Indonesia	Nicaragua	Guatemala
Kenya	Madagascar	Nigeria	Haiti
Mexico	Mexico	Philippines	India
Mozambique	Mongolia	Rwanda	Jordan
Nicaragua	Nepal	Sri Lanka	Kazakhstan
Nigeria	Palestine	Togo	Kosovo
Peru	Paraguay	Turkey	Madagascar
Philippines	Peru	Uganda	Mexico
Togo	Senegal		Mongolia
Uganda	Tajikistan		Morocco
			Mozambique
			Nicaragua
			Pakistan
			Palestine
			Peru
			Philippines
			Slovakia
			Yugoslavia

Table 15 - MFI regulation and deposit collection by country. Source: Nadolnyak and Hartarska (2007).

However many institutions do not have the capital to start a collection of deposits or the will to be eligible to take them from their clients for which a banking licence is necessary in many developing countries. It is also evident (see Table 15) that being a regulated MFI does not provide the immediate access to deposits collection. The table illustrates where countries are grouped according to the possibility of collecting deposits and they are or they are not a regulated MFI. Therefore the regulation of a microfinance institution can be affected by their necessity to do so, should they wish to improve their financial sustainability by taking deposits from their clients.

Operational self-sufficiency. The positive value of 18.76 which is significant at 1% becomes important in the robustness of the model. It is obvious that there is a positive relationship between this variable and the FSS because of the similar calculation. The only factors that affect the difference between the two self-sufficiency parameters are the two

macroeconomic variables which have been earlier explored. Moreover it is clear that in order to be financially sustainable an institution needs to reach operational self-sufficiency first.

Operating expense / assets. The negative value of – 6.60 and its significance at a 1% level underlines the negative connection between FSS and this ratio. It is quite intuitive that lower the operating expenses (both as an absolute value and as a percentage of assets) and higher FSS will be. It is indeed a challenge for any microfinance institutions to find innovative ways to lower these costs in order to boost revenues and become sustainable.

Portfolio at risk > 90 days. This variable is significant at a 1% level with a value of – 2.69. As the portfolio at risk (PAR) indicates the portion of portfolio which is at risk of defaulting is clear that a low value will enhance the possibility for a MFI to be sustainable in the long run. Although the portfolio at risk is not a risk indicator of defaults and it does not have to do with repayment rates, it seems to be important to influence sustainability for an institution. One of the reasons for this positive correlation is given by the likelihood that an institution with a low level of PAR will have a history of good clients paying on time and as a consequence a good management will have forecasted revenues enough to cover the costs.

Non-earning liquid assets as a percentage of total assets. The negative value of -6.13 significant at a 1% level shows the importance of avoiding the presence of assets which are not being invested. A microfinance institution which keeps lots of cash not lent as loans or for other expenses in the short term does not find itself in a good position to be financially sustainable in the long term. One of the motives is that assets lying in the MFI accounts are affected and devalued over time by inflation and therefore higher the inflation in a specific country and higher is the negative impact to have non-earning liquid assets in a particular institution. However it is important to point out that there are specific reserve requirements for those institutions which offer deposit services to their clients. Those regulated institutions generally have to obey a banking legislation that forces them to have a percentage of their deposits available as liquidity.

Yield on gross portfolio (nominal). This independent variable calculated by MixMarket is highly significant at a 1% level with a value of 12.99. A positive relation is found between this parameter and the financial sustainability and it is quite understandable although it is not one of those parameters the MFI can directly affect without losing competitiveness because of its nature of calculation which includes the revenues from interest and fees. For this reason the only way

for the MFI to positively affect this variable is to become more pricy by charging a higher interest rate or fees.

In the current study countries have been grouped in five regional groups. In the following analysis regional dummies are all compared to the regional base which is South-East Asia. For the purpose of the study it means that the values of regional dummies resulted from the model are to be compared one by one with the base region South-East Asia. Western Europe, North America and Australia have not been included in the study.

Africa dummy. The first regional dummy shows a negative value of - 2.77 and is statistically significant at a 1% level. South-East Asia institutions are more financially sustainable than African institutions.

Central Asia dummy. A similar analysis can be done for this dummy which also includes Eastern Europe which resulted with a negative value of - 3.68 and significant at a 1% level. Even within Asia, South-East Asia MFIs present a higher possibility to be financially sustainable compared to Central Asia.

Middle East dummy. This dummy which also represents northern regions of Africa has also a negative value of - 2.58 significant a 1% level which implies a negative relationship between the MFIs operating in Middle East and Northern Africa and the dependent variable (FSS) when the base used is the South-East Asia region.

Latin America dummy. In the same way, this variable shows a negative value of - 3.36 statistically significant at a 1% level. Although Latin America has many success stories in the field of microfinance and particularly in the sustainability of their institutions (Compartamos in Mexico) the study reveals that, on average, Latin American institutions are less financially sustainable than their counterparts in South-East Asia.

Outlier dummy. The presence of this dummy variable has been important from an econometric point of view to partly correct for heteroscedasticity in the model. The positive value of 5.92 is significant at a 1% level and shows the possibility that the observation in question might affect the quality of the model.

4.2 Overall discussion

Following the discussion and the economic meaning of the single variables, the findings of the empirical research are now discussed using an overall perspective and placing these variables

in the respective groups. Therefore the results are examined in the context of the MFIs capital structure, the geography, its macroeconomic environment and its management. Finally we briefly discuss the implications of the variables that have been excluded from the study for multiple reasons.

4.2.1 Capital structure

One of the first observations that might be done is the importance of the capital structure of the MFI. Results show how a low capital over assets ratio positively affects the financial sustainability of the institution. Giving that all the banking or lending legislation is satisfied in the given country, an institution is better off when the part of capital is low when compared to the total assets. As it as been discussed earlier, there is an optimal and imaginary limit of the debt ratio that the institution should not cross in order to avoid financial distress. The concept is very well known in corporate finance and it takes the name of trade-off theory.

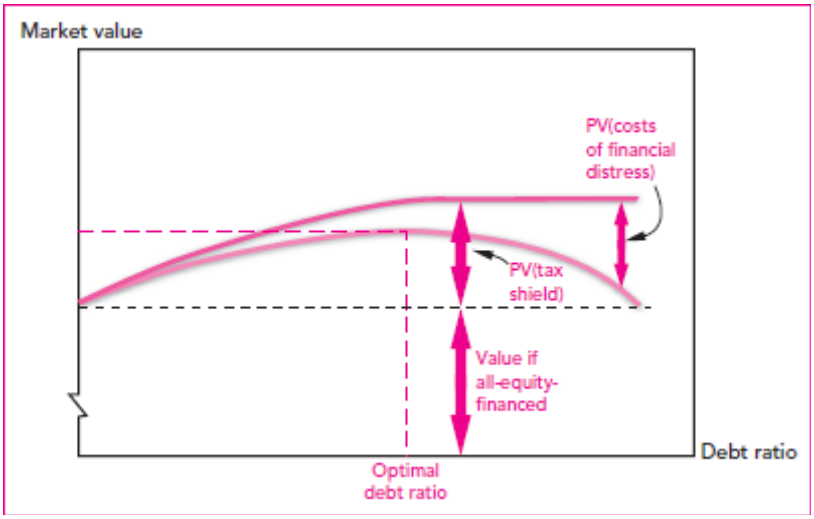


Figure 9 – Optimal debt ratio. Source: Brealey, Meyers (2003)

Figure 9 graphically represents that theory that states that the optimal ratio is reached when the present value of tax savings due to further borrowing is offset by the increase in the present value of costs of distress which are made of bankruptcy costs both direct and indirect. At this theoretical level the debt is stretched to the point where the value of the company is the highest. Just at the same way it happens in company, the same principle can be applied to the MFI.

Having this concept in mind, the optimal capital structure is the one that allows the MFI to have highest debt ratio possible right before falling into financial distress. Among all the type of debts, a MFI wishes to find the cheapest kind of liability that might give the higher return and give the possibility to be more efficient. That is why the second result shows the importance to have a significant amount of deposits within the MFI assets. Whilst this is a common practice within the traditional banking sector, it might not be the same for the microfinance sector. The difficulties and the obstacles to obtain a licence to allow MFIs to collect deposits from clients and the lack of capital which many MFIs have to face are a barrier to the sustainability of the institution. In this situation the MFI's debt is far more expensive and it could be resulting in higher interest rates or fees to charge to clients.

The capital structure analysis is confirmed by previous studies: Bogan, Johnson & Mhlanga (2007) during their study on the institution life cycle had to reject the hypothesis that the age of an institution affects its sustainability. However they draw important conclusions by finding the significance of the capital structure to have long term sustainability and in particular that the percentage of share capital over the total assets is negatively related to the sustainability.

The findings provided by Coleman (2007) are an additional confirmation of the importance of the capital structure for MFIs which should finance themselves with debt in order to increase profitability, sustainability and outreach of clients. Coleman also noticed how highly leveraged MFIs perform better in terms of default rates because the reduction of agency costs following the MFI leverage encourages the institution management to take measures to prevent and reduce defaults.

4.2.2 Regional aspect

In previous studies the regional aspect has never been relevant to show whether some regions are more prepared or have legislations that favour the sustainability of institutions. However Caudill, Gropper and Hartarska (2009) noticed as Central Asian regions performed better than Eastern European in regards to limit their costs. On the other hand Bogan, Johnson & Mhlanga (2007) did not find any kind of influence of the region on the financial sustainability of an institution.

Therefore the different results in the previous studies do not serve as a confirmation to the important finding of this study that South East Asian MFIs perform better in terms of

sustainability than their counterparts in other parts of the world. It is not an easy task to identify the reason for this finding as it could easily be a combination of other factors.

Following the importance and the success of microfinance in countries like Indonesia, India and Bangladesh, the need of legislation has been important and could be one of the reasons. It is important to remember that countries with the higher penetration of microfinance are mostly situated in South-East Asia (Vietnam and Bangladesh have a penetration of 25% and 35%).[9]

Therefore also the number of assets mobilized in the region needs to be considered and studied further, as well as the economic growth in the region which has been higher than other parts of the world in the last two decades.

4.2.3 Macroeconomic aspect

In previous studies there were no macroeconomic factors that have been studied to prove a possible correlation to the sustainability of microfinance institutions mostly because they were not considered in their definition of sustainability. In the current study, the model suggests the importance of those variables in the long term sustainability of an institution. In particular the inflation and lending rates have their consistent influence in the goal of sustainability. The reasons are explained in the single analysis of the variables. Here we discuss the importance of the economic environment of a particular country for all the shareholders involved in the process. New MFIs that do not aim to serve a particular country and have flexibility in the choice of country of operation have a better possibility to reach the goal of sustainability in stable countries and with low levels of inflation and lending rates. Obviously the same principle applies for those investors that are interested in investing or make a loan to an institution.

However this is a principle which holds for all sectors in a particular economy and the microfinance sector is not exception.

4.2.4 Other management aspects

In addition to the previous aspects analysed, other management data can be used to assure financial sustainability to a particular institution. The reason why they have been assigned to management is due to the possibility to manage the outcome of these ratios. A low PAR assures

9 Deutsche Bank Research, 2007, "Microfinance: An Emerging Investing Opportunity: Uniting Social Investment And Financial Returns", p. 10

a low rate of defaults and a good quality of the portfolio. Just as it happens in the traditional banking environment, where the management tries to minimize the risk of defaulting through risk management tools, it is relevant for the MFI's management to put in place processes necessary to have a quality portfolio with high level of repayments and low level of defaults.

MFI management can also affect the other variable found to be positively correlated to financial sustainability which is yield over gross loan portfolio. Although the intuitive relation of higher interest rates followed by higher sustainability, MFIs are encourage to find those borrowers that have a lower adverse selection to higher interest rates and in few words those borrowers and those businesses that have higher marginal gain per unit of capital borrowed. The interest rate applicable to those borrowers is substantially higher because the higher gain will enable them to repay their debt and still be profitable. This careful monitoring of the results should lead to unchanged performance in PAR and default rates.

Another ratio that showed a negative relationship with the dependent variable is operating expenses over assets. The influence that management can apply to this ratio is relevant and it suggests concentrating in finding innovative ways to cut operating costs should the MFI wish to achieve sustainability.

Last but not the least management should pay attention to those liquid assets which do not generate revenues because they are placed temporarily on hold. Non-earning liquid assets should be invested in the activity of providing loans and this is especially important for those institutions that do rely on subsidies and they do not use the full potential of the grants obtained.

4.2.5 Variables excluded

Besides the variables included in the study, it is right to mention those variables that have not been included in the model because not statistically significant or because of lack of data.

MFIs have been grouped in regulated and not regulated institutions. The former type of variable has not been significant like also Hartarska and Nadolnyak (2007) found in their paper. Moreover, besides the regulation or not, also the kind of legal status did not show difference in terms of FSS: MFIs have been divided in five groups which were non-bank financial institution (NBFI), Bank, Rural Bank, NGO and Other. Therefore the legal status is not found to affect the sustainability of a MFI.

The 687 MFIs have also been divided in groups according their age. Life cycle theory might have suggested that older institutions would perform better sustainability wise than younger ones. However that was not the case as it was also found by Bogan et al. (2007) where the life cycle theory was not confirmed during their studies.

At the same way gender of borrowers did not show any particular difference suggesting that practices and processes are more important than the gender of the MFI clients. Moreover it was also excluded because data on gender of MFIs' clients is sometimes absent among the studied institutions.

Among other variables considered the average loan amount has been included to discuss the hypothesis that a higher average loan size would lower the cost per loan and give a higher return and profitability. However MFIs studied did not provide any relevance to the correlation with sustainability just as Cull et al. (2009) found in their study. It is probable that higher fees and interest rates are applied to low loan amounts showing that the price component (interest rate) is not the main factor for clients who apply for a loan of low amount. In addition it gives a good signal to those institutions which desire to focus on the poorest of the poor that it is possible to be financially self-sufficient even providing loans of smaller amounts.

Another important variable has been excluded is the group or individual kind of lending applied by the MFIs. Although the information is made available by Mixmarket, only few data were available in respect to this type of methodology. As the data collected by the organization will become more precise, it will be interesting to use it as a parameter to find a possible correlation with the financial sustainability. The same applies for the selection recently introduced that divide customers among rural and urban that can present additional information whether an institution might obtain benefits in concentrating in rural areas.

5. CONLUSIONS

Due the increasing interest in the long term sustainability for microfinance institutions, the study attempts to address one basic question: which factors influence the financial sustainability of microfinance institutions? An empirical approach to answer the question is used. Based on a high quality sample of 687 institutions based in 63 countries in the world, we find that the answer is given by different parameters.

Firstly, capital structure plays an important role in the sustainability of MFIs as previous studies also confirmed (Bogan, Johnson & Mhlanga, 2007 and Coleman, 2007). The capital/asset ratio is statistically significant and negatively associated to financial sustainability suggesting that high leveraged institutions are more likely to be sustainable. The collection of deposits is another factor that positively influences an institution for two reasons: apart from having the benefit to leveraging the company being considered short term debt, they are also the cheapest debt available left aside concessional loans or subsidies.

Moreover a further answer is given by the MFI's region of operation. We find that South-East Asian and Central Pacific MFIs perform relatively better than other regions. Although microfinance is widespread in South East Asia there is no evidence (cultural, legislative or simply macroeconomic) of the reason why MFIs located there might have a comparative or competitive advantage in regards to MFIs located throughout the world. However it should be considered a component to keep in mind for future studies.

The macroeconomic environment also affects the sustainability of MFIs. In particular, the two variables studied are found to be statistically significant. A low inflation rate gives the MFI higher possibilities to reach or maintain sustainability and, in case of high inflated country, high leverage becomes even more important not to erode MFI equities. A low lending rate gives the chance to MFIs to be more competitive and charge lower prices to avoid adverse selection of borrowers. The importance of those variables is also enhanced in countries where an interest rate ceiling is in place which limits the MFI's margin necessary to operate and be at the same time sustainable.

Among the other significant variables we find the influence of the indicator of portfolio performance (PAR > 30 days). Institutions with low PAR are in a better position because their repayment rates are higher and it also means a good repayment culture with no delays and prompt payments. Non-earning liquid assets as percentage of total assets also indicate the benefit

gained from sustainability from using the cash available in a productive way such as new investments or new loans, unless it is used as a deposit reserve prescribed by local banking legislation.

The intuitive positive correlation between high interest rates and sustainability is confirmed by the significance of the yield on gross portfolio. The positive sign of the ratio indicates that higher interest rates and fees lead to financial sustainability. However this finding has to put in perspective of the environment, the competition found by the MFI, the interest rates ceiling applied by some countries legislation and the borrowers adverse selection that might arise at certain levels of interest rates.

5.1 Implications for microfinance institutions

The study findings could have implications for MFIs and their management processes. In particular concentrating on the collection of deposits where the legislation allows it can be a viable option towards sustainability thanks to the relatively cheap source of financing represented by deposits that, contrary to the popular mind, are well available in developing countries. Besides the cheap alternative to the access to commercial debt, the additional service also appeals to the MFI clients being an additional financial service which is often not present in developing countries and especially in rural areas. However it is obvious that MFIs should weight the costs to add this additional service according to their environment.

Paying attention not to fall into financial distress and given the commercial availability, MFIs are encouraged to leverage their debt positions like South East Asian MFIs managed to do very well with positive effects on their sustainability. Moreover a careful management and investment of the liquid assets can lead to additional revenues that enhance the institution sustainability. MFI's management should also consider the local environment, the competition and the adverse selection of the borrowers to find up to which level they can increase interest rates without affecting PAR and defaults rates.

5.2 Implications for policies

The above conclusions have also important consequences at a policy level, both macroeconomic (through legislation and governments) or microeconomic level (through networks and organizations). The positive relation between deposits and financial sustainability

suggests that a legislation that facilitates the collection of deposits would enhance the profitability of institutions: in this respect many developing countries have adopted banking legislations that do not allow the collection of savings from clients unless they are formally registered as traditional banks. Only in same cases in some countries, other institutions with different legal status are allowed to collect deposits but only among their members like in the case of cooperatives. However it is important to remember to recognize at the same time the right protection for the customer savings.

In the same way a substantial equilibrium should be found by institutions (and for this purpose they could be given some guidelines by some microfinance networks) to find an efficient capital structure with a suggested ratio between capital and assets which enhances the self-sufficiency of the same institution explaining at the same time the weaknesses of agency costs and financial distress in case of a highly leveraged MFI.

Furthermore, having an economy with controlled and stable inflation is an advantage that would benefit the whole national economy for foreign investments and therefore it is no surprise that it would also benefit the microfinance sector and the sustainability of the national microfinance institutions.

5.3 Implications for further research

The conclusions have consequences for further research in the field of microfinance.

Firstly the regional importance of MFIs needs to be further studied to deeply understand why specific regions like South East Asia perform better than others in regards to sustainability. It is important to study what the causes of this success are to eventually extend this profitability and/or mentality to other regions worldwide. In particular it would be interesting to show whether this sustainability is given by the correlation with other variables or simply by the legislative environment present in these regions.

Beside the relevant and significant variables used within the study, the combination of these factors with other parameters that MixMarket is being continuously collecting would be important to find additional factors leading to financial sustainability which have not been addressed in this study in order to inform all the relevant stakeholders. Empirical studies made on a significant amount of institutions regarding the effects on the MFIs' financial sustainability created by group/individual and rural/urban-based lending would be a step forward in analysing

the factors that can make microfinance work in a sustainable way. Furthermore the addition of other macroeconomic, legislative or cultural variables could explain the reasons of the difference in performance among regions. Last but not the least it would be interesting to research the consequences on sustainability of additional services (Gonzalez 2007) offered by microfinance institutions to observe which ones among them are more efficient for MFIs to implement.

Finally, besides the importance of the data provided by MixMarket it would be also valuable to study the effect of the pricing of those MFIs. MixMarket does not provide data regarding the interest rates charged by microfinance institutions to their clients apart from an approximate figure represented by the yield on gross portfolio. This fundamental gap in data availability is being recently filled by an organization called MfTrasparency which is slowly providing data regarding the pricing applied by institutions to their customers. The combination of data would be a great asset for future researchers to identify whether an important correlation could be found between interest rates and long term sustainability.

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Appendix A: CGAP Key Principles of Microfinance

CGAP helped developing key principles of microfinance to define a guideline on the goals of the strategy. In 2004 the principles stated below were endorsed by CGAP and its donors. They have been later on endorsed also by leaders at the G8 Summit held in 2004. The eleven principles are:

1. The poor need a variety of financial services, not just loans. Just like everyone else, poor people need a wide range of financial services that are convenient, flexible, and reasonably priced. Depending on their circumstances, poor people need not only credit, but also savings, cash transfers, and insurance.
2. Microfinance is a powerful instrument against poverty. Access to sustainable financial services enables the poor to increase incomes, build assets, and reduce their vulnerability to external shocks. Microfinance allows poor households to move from everyday survival to planning for the future, investing in better nutrition, improved living conditions, and children's health and education.
3. Microfinance means building financial systems that serve the poor. Poor people constitute the vast majority of the population in most developing countries. Yet, an overwhelming number of the poor continue to lack access to basic financial services. In many countries, microfinance continues to be seen as a marginal sector and primarily a development concern for donors, governments, and socially-responsible investors. In order to achieve its full potential of reaching a large number of the poor, microfinance should become an integral part of the financial sector.
4. Financial sustainability is necessary to reach significant numbers of poor people. Most poor people are not able to access financial services because of the lack of strong retail financial intermediaries. Building financially sustainable institutions is not an end in itself. It is the only way to reach significant scale and impact far beyond what donor agencies can fund. Sustainability is the ability of a microfinance provider to cover all of its costs. It allows the continued operation of the microfinance provider and the ongoing provision of financial services to the poor. Achieving financial sustainability means reducing transaction costs, offering better products and services that meet client needs, and finding new ways to reach the unbanked poor.

5. Microfinance is about building permanent local financial institutions. Building financial systems for the poor means building sound domestic financial intermediaries that can provide financial services to poor people on a permanent basis. Such institutions should be able to mobilize and recycle domestic savings, extend credit, and provide a range of services. Dependence on funding from donors and governments—including government-financed development banks—will gradually diminish as local financial institutions and private capital markets mature.
6. Microcredit is not always the answer. Microcredit is not appropriate for everyone or every situation. The destitute and hungry who have no income or means of repayment need other forms of support before they can make use of loans. In many cases, small grants, infrastructure improvements, employment and training programs, and other non-financial services may be more appropriate tools for poverty alleviation. Wherever possible, such non-financial services should be coupled with building savings.
7. Interest rate ceilings can damage poor people's access to financial services. It costs much more to make many small loans than a few large loans. Unless microlenders can charge interest rates that are well above average bank loan rates, they cannot cover their costs, and their growth and sustainability will be limited by the scarce and uncertain supply of subsidized funding. When governments regulate interest rates, they usually set them at levels too low to permit sustainable microcredit. At the same time, microlenders should not pass on operational inefficiencies to clients in the form of prices (interest rates and other fees) that are far higher than they need to be.
8. The government's role is as an enabler, not as a direct provider of financial services. National governments play an important role in setting a supportive policy environment that stimulates the development of financial services while protecting poor people's savings. The key things that a government can do for microfinance are to maintain macroeconomic stability, avoid interest-rate caps, and refrain from distorting the market with unsustainable subsidized, high-delinquency loan programs. Governments can also support financial services for the poor by improving the business environment for entrepreneurs, clamping down on corruption, and improving access to markets and infrastructure. In special situations, government funding for sound and independent microfinance institutions may be warranted when other funds are lacking.

9. Donor subsidies should complement, not compete with private sector capital. Donors should use appropriate grant, loan, and equity instruments on a temporary basis to build the institutional capacity of financial providers, develop supporting infrastructure (like rating agencies, credit bureaus, audit capacity, etc.), and support experimental services and products. In some cases, longer-term donor subsidies may be required to reach sparsely populated and otherwise difficult-to-reach populations. To be effective, donor funding must seek to integrate financial services for the poor into local financial markets; apply specialist expertise to the design and implementation of projects; require that financial institutions and other partners meet minimum performance standards as a condition for continued support; and plan for exit from the outset.
10. The lack of institutional and human capacity is the key constraint. Microfinance is a specialized field that combines banking with social goals, and capacity needs to be built at all levels, from financial institutions through the regulatory and supervisory bodies and information systems, to government development entities and donor agencies. Most investments in the sector, both public and private, should focus on this capacity building.
11. The importance of financial and outreach transparency. Accurate, standardized, and comparable information on the financial and social performance of financial institutions providing services to the poor is imperative. Bank supervisors and regulators, donors, investors, and more importantly, the poor who are clients of microfinance need this information to adequately assess risk and returns.

Appendix B: Index of tables and graphs

Index of tables.

Index of figures

Index of graphs

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

Number of Observations Read	687
Number of Observations Used	687

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	14	41.33699	2.95264	120.73	<.0001
Error	672	16.43517	0.02446		
Corrected Total	686	57.77216			

Root MSE	0.15639	**R-Square**	0.7155
Dependent Mean	0.95036	**Adj R-Sq**	0.7096
Coeff Var	16.45571		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	0.52470	0.03811	13.77	<.0001
Inflation rate		1	-0.00734	0.00073668	-9.96	<.0001
Lending rate		1	-0.00322	0.00083207	-3.87	0.0001
Capital/asset ratio		1	-0.22819	0.03314	-6.89	<.0001
Deposits to total assets		1	0.19369	0.02389	8.11	<.0001
Operational self sufficiency		1	0.46417	0.02474	18.76	<.0001
Operating expense/ assets		1	-0.55673	0.08431	-6.60	<.0001
Portfolio at risk > 90 days		1	-0.22665	0.08412	-2.69	0.0072
Non-earning liquid assets as a %	Non-earning liquid assets as a % of total assets	1	-0.33766	0.05512	-6.13	<.0001
Yield on gross portfolio (nomina	Yield on gross portfolio (nominal)	1	0.71596	0.05510	12.99	<.0001
Africa dummy		1	-0.07229	0.02612	-2.77	0.0058
Central Asia dummy		1	-0.07161	0.01948	-3.68	0.0003
Middle East dummy		1	-0.08858	0.03429	-2.58	0.0100
Latin America dummy		1	-0.06189	0.01843	-3.36	0.0008
Outlier dummy		1	1.09442	0.18476	5.92	<.0001

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

Collinearity Diagnostics (intercept adjusted)							
			Proportion of Variation				
Number	Eigenvalue	Condition Index	Inflation rate	Lending rate	Capital/asset ratio	Deposits to total assets	Operational self sufficiency
1	2.49961	1.00000	0.01913	0.01137	0.00832	0.00864	0.01302
2	1.75547	1.19327	0.01964	0.00208	0.10112	0.08478	0.05357
3	1.48911	1.29561	0.06621	0.03149	0.00231	0.01461	0.01300
4	1.37516	1.34822	0.01371	0.01278	0.00305	0.01648	0.00679
5	1.27293	1.40131	7.194943E-9	0.05249	0.01444	0.04882	0.02544
6	1.08079	1.52078	0.07690	0.23252	0.01301	0.01874	0.01925
7	0.97400	1.60197	0.00388	0.11287	0.00115	0.00133	0.00016212
8	0.76074	1.81266	0.16137	0.06774	0.07573	0.01708	0.00412
9	0.71328	1.87200	0.41736	0.02382	0.06010	0.00214	0.00002558
10	0.70392	1.88441	0.01564	0.19577	0.00066066	0.30719	0.00854
11	0.58364	2.06950	0.09434	0.09610	0.18579	0.21983	0.10656
12	0.45603	2.34122	0.01318	0.03138	0.31159	0.22224	0.24440
13	0.21514	3.40860	0.08025	0.12230	0.03891	0.03737	0.01367
14	0.12018	4.56052	0.01838	0.00730	0.18383	0.00075883	0.49145

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

Collinearity Diagnostics (intercept adjusted)

Proportion of Variation

Operating expense/ assets	Portfolio at risk > 90 days	Non-earning liquid assets as a %	Yield on gross portfolio (nomina	Africa dummy	Central Asia dummy	Middle East dummy	Latin America dummy
0.02443	0.00435	0.00479	0.02544	0.00216	0.02231	0.00041524	0.02482
0.00102	0.01245	0.00066539	0.00190	0.00543	0.00147	0.03444	0.00162
0.01249	0.00162	0.01869	0.01593	0.10979	0.00569	0.00093484	0.08077
0.00700	0.00077780	0.19024	0.00510	0.01062	0.10242	0.07726	0.00001154
1.10143E-7	0.00168	0.01491	0.00037612	0.07516	0.00332	0.15883	0.00683
0.00835	0.16514	0.00841	0.03843	0.04063	0.00229	0.00173	0.00015355
0.00037968	0.66434	0.00565	0.00026715	0.02614	0.00054451	0.00170	0.00048739
0.00036229	0.00624	0.32863	0.00182	0.02205	0.09368	0.08798	0.04594
0.00292	0.00113	0.17309	0.01682	0.17625	0.00948	5.195814E-9	0.04603
0.00183	0.01429	0.07154	0.01952	0.00361	0.01488	0.42280	0.00096246
0.00524	0.02329	0.00026543	0.00845	0.00255	0.00765	0.04694	0.06683
0.01383	0.08039	0.00312	0.09677	0.00483	0.00381	0.00086908	0.02403
0.04942	0.00091211	0.10103	0.00554	0.50735	0.65853	0.15444	0.66585
0.87273	0.02337	0.07898	0.76364	0.01346	0.07393	0.01166	0.03568

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

Collinearity Diagnostics (intercept adjusted)
Proportion of Variation
Outlier dummy
0.00210
0.04875
0.00077070
0.02097
0.15468
0.02783
0.08115
0.00000776
0.04189
0.00005500
0.25742
0.19758
0.00362
0.16319

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

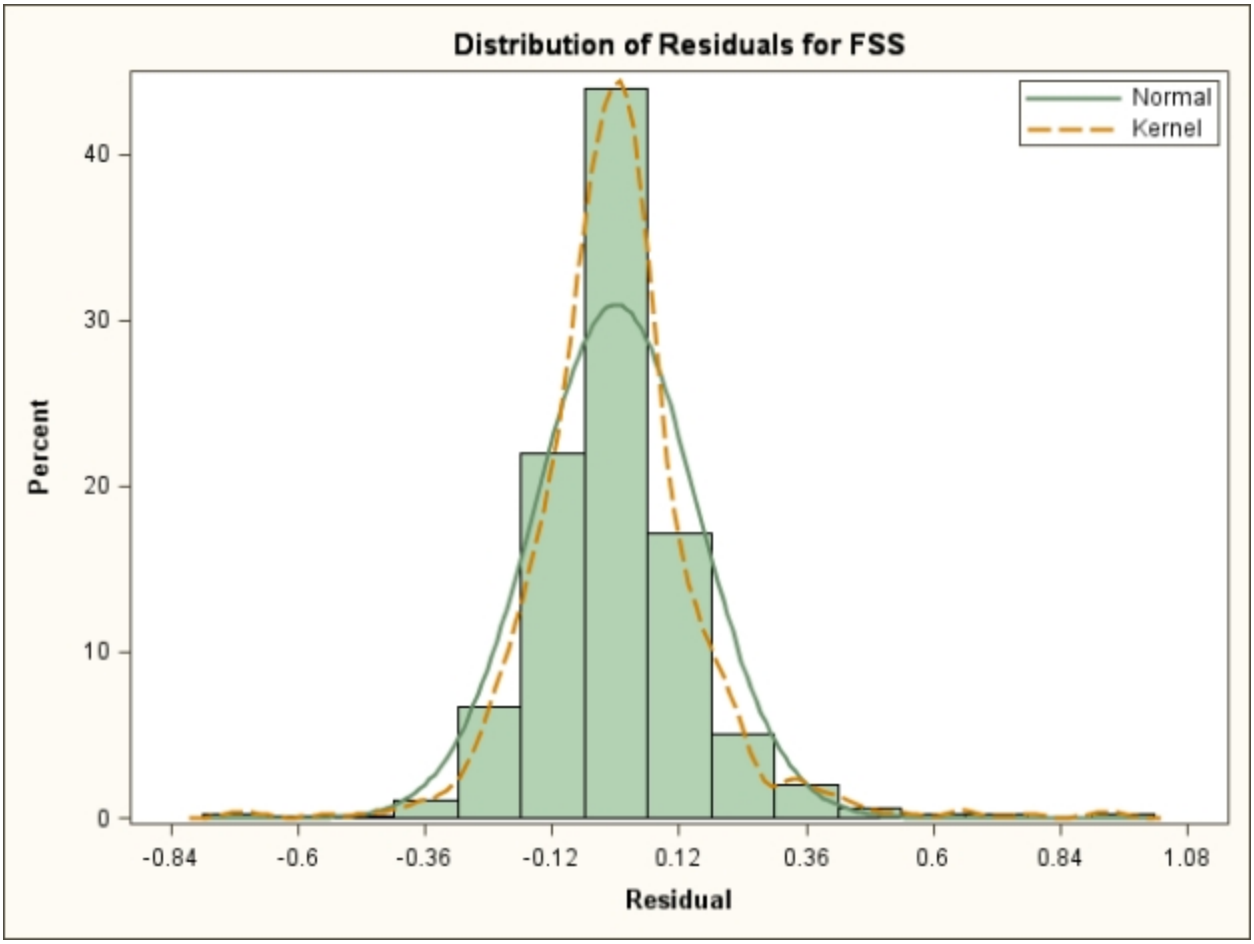
Test of First and Second Moment Specification		
DF	Chi-Square	Pr > ChiSq
96	122.35	0.0361

Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

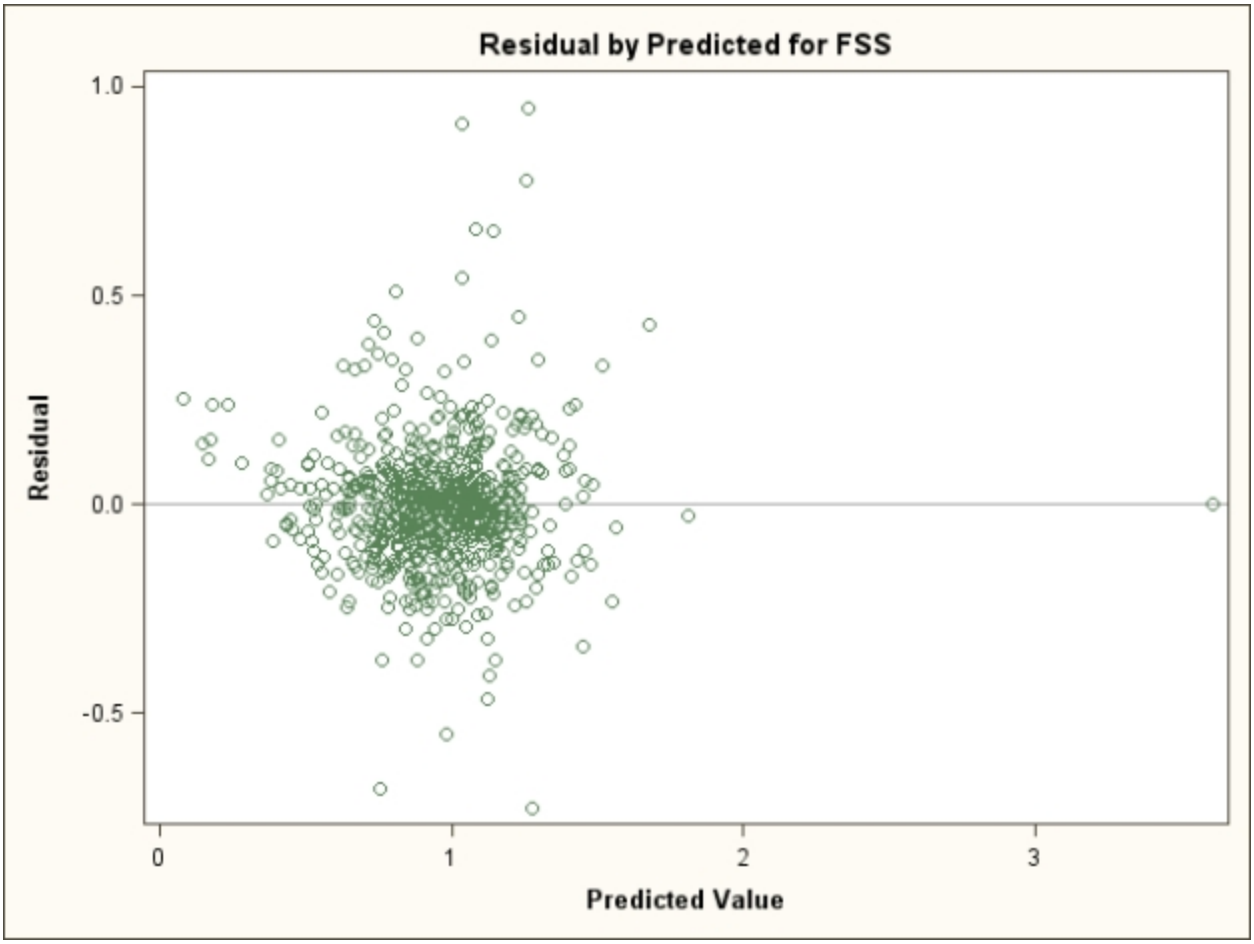


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS



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Model: Linear_Regression_Model

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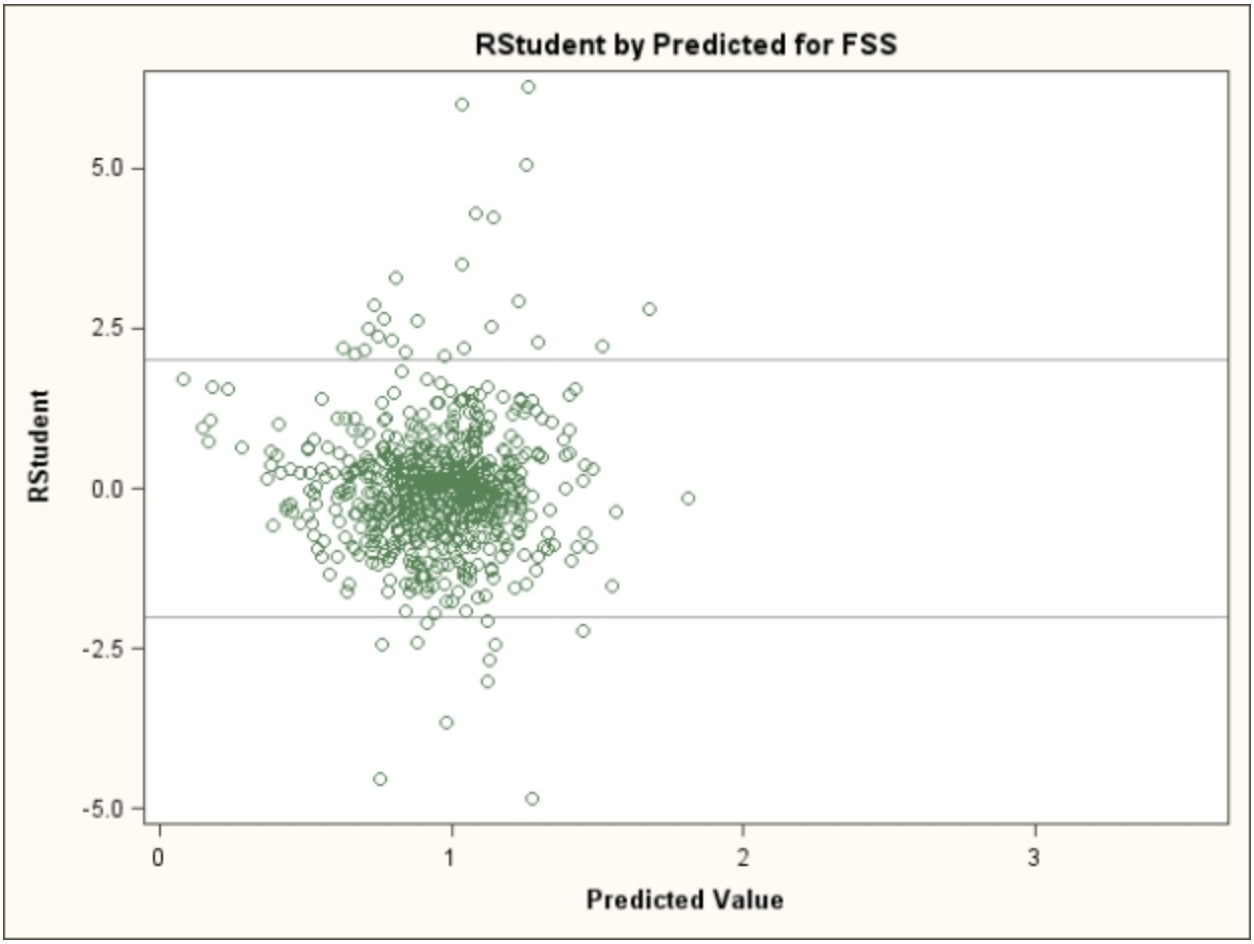
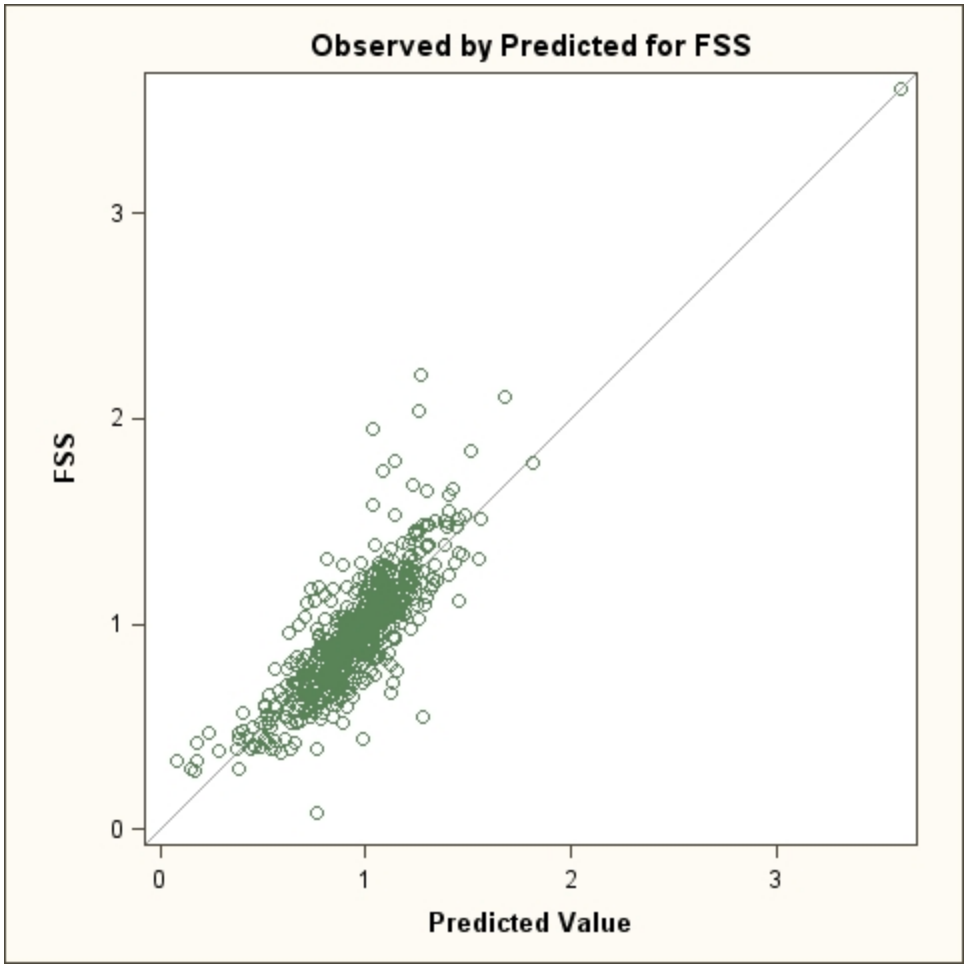


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

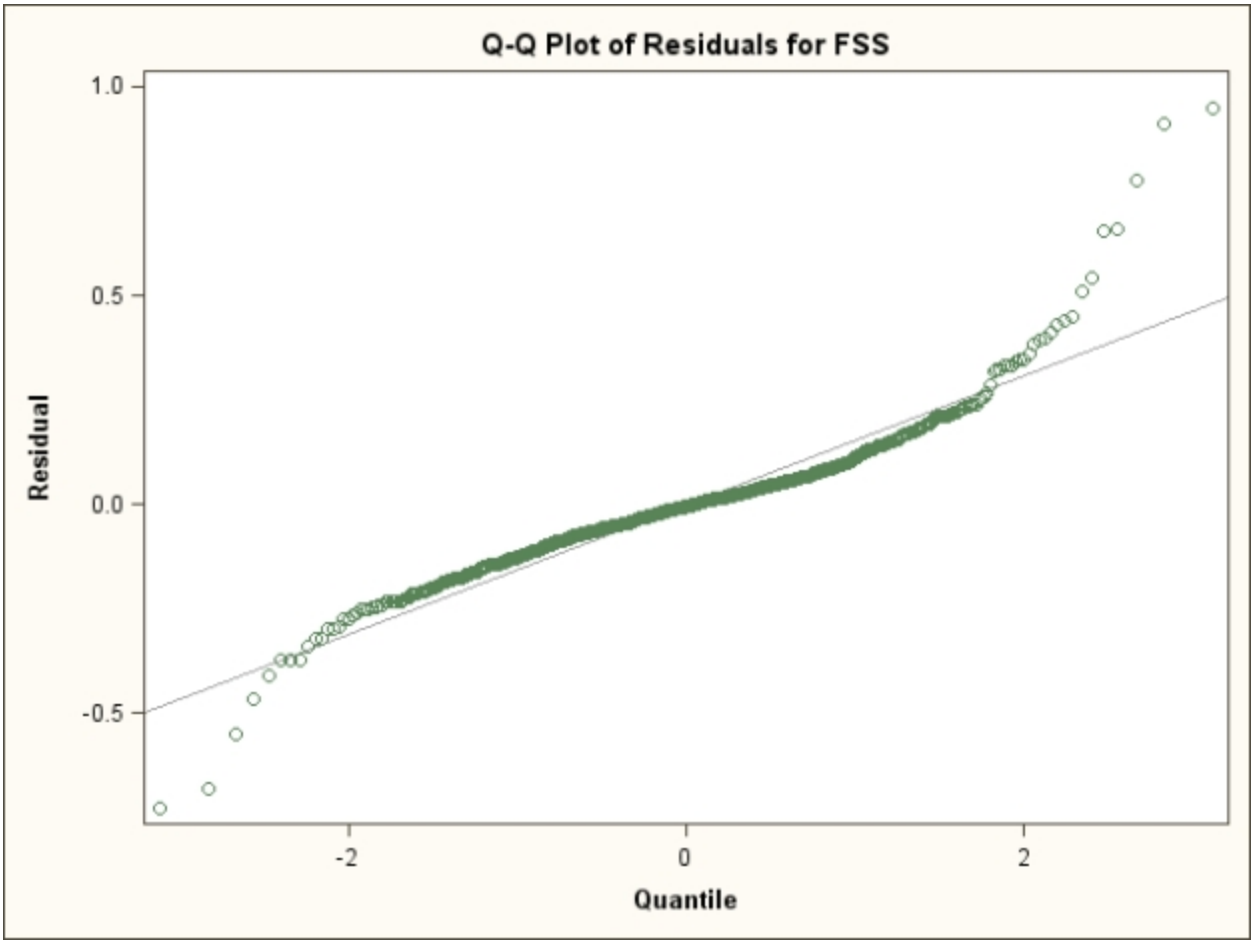


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

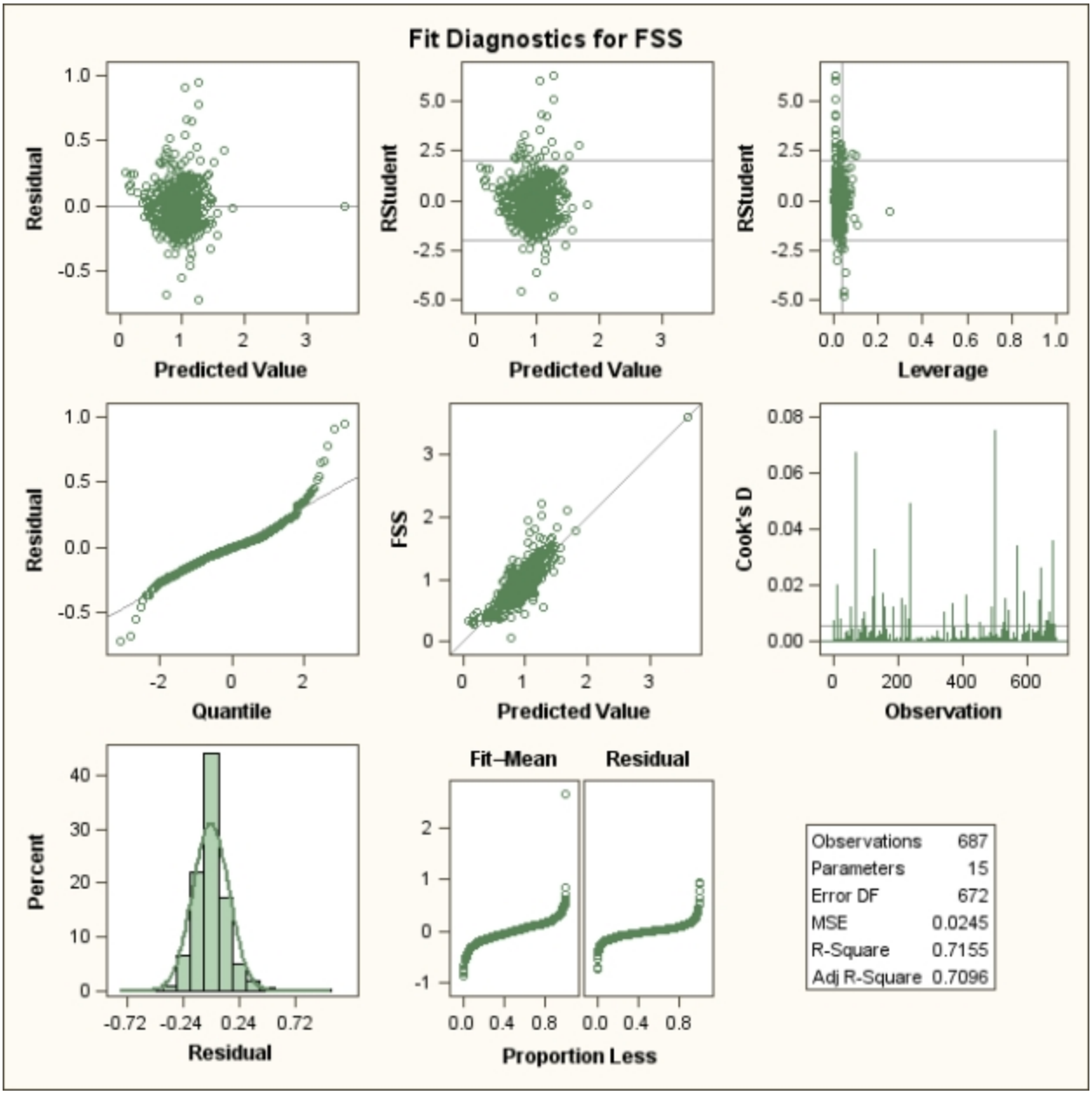


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

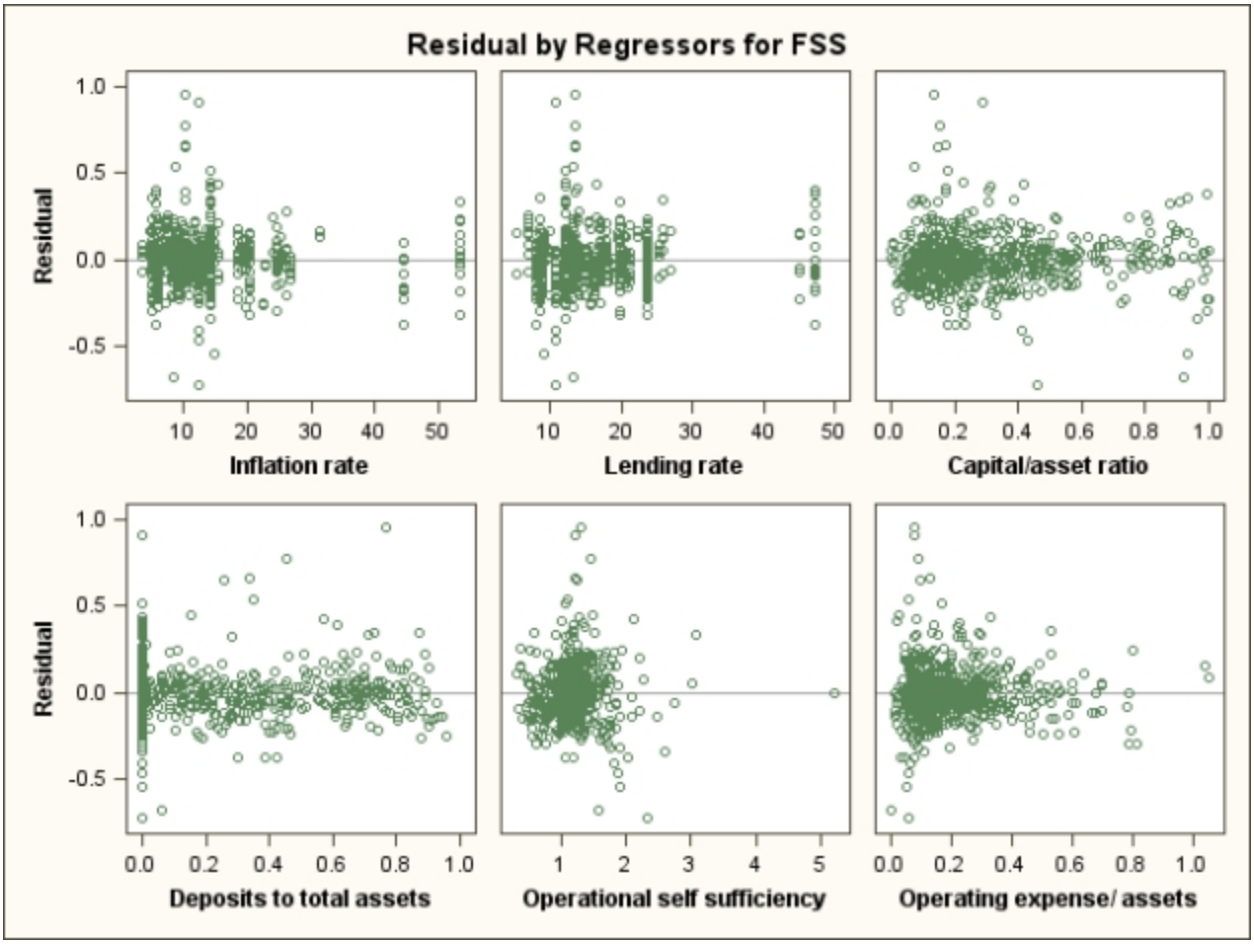


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

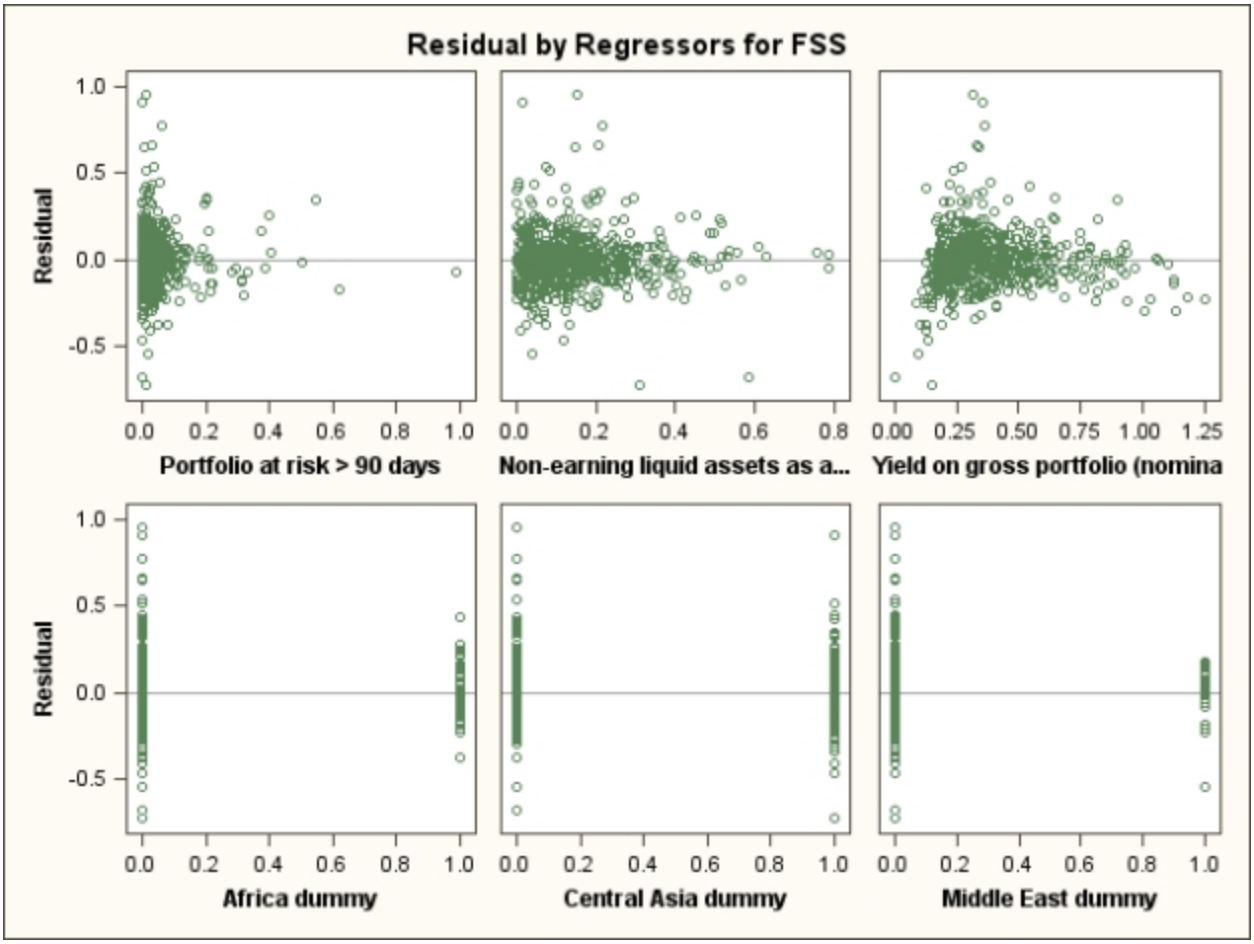


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS

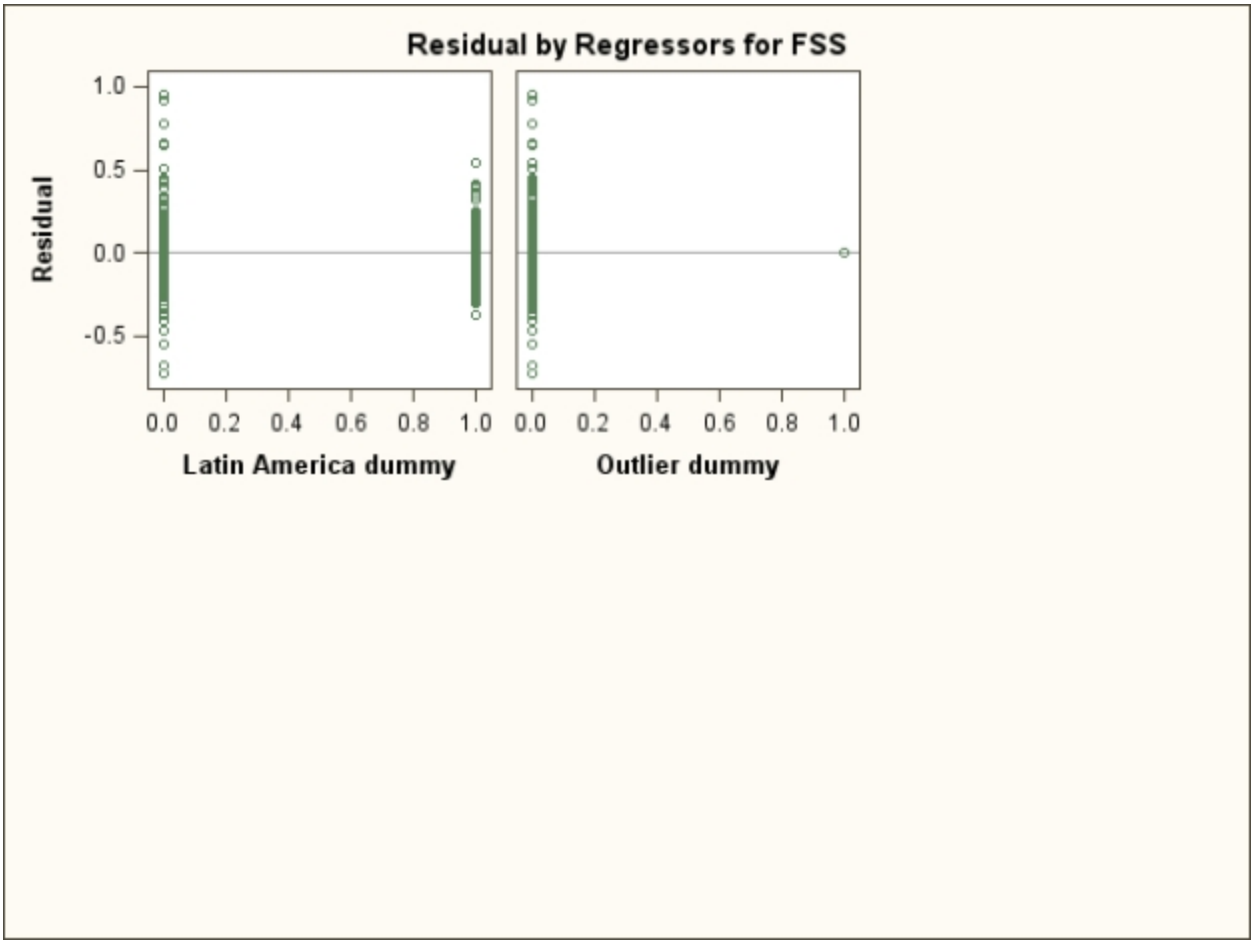


Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: FSS



Linear Regression Results

The MODEL Procedure

Model Summary	
Model Variables	1
Parameters	15
Equations	1
Number of Statements	1

Model Variables	FSS
Parameters	b0 b1 b2 b3 b4 b5 b6 b7 b8 b9 b10 b11 b12 b13 b14
Equations	FSS

The Equation to Estimate is	
FSS =	F(b0(1), b1(Inflation rate), b2(Lending rate), b3(Capital/asset ratio), b4(Deposits to total assets), b5(Operational self sufficiency), b6(Operating expense/ assets), b7(Portfolio at risk > 90 days), b8(Non-earning liquid assets as a %), b9(Yield on gross portfolio (nomina), b10(Africa dummy), b11(Central Asia dummy), b12(Middle East dummy), b13(Latin America dummy), b14(Outlier dummy))
Instruments	1 Inflation rate Lending rate Capital/asset ratio Deposits to total assets Operational self sufficiency Operating expense/ assets Portfolio at risk > 90 days Non-earning liquid assets as a % Yield on gross portfolio (nomina Africa dummy Central Asia dummy Middle East dummy Latin America dummy Outlier dummy

NOTE: At 2SLS Iteration 1 convergence assumed because OBJECTIVE=7.205681E-29 is almost zero (<1E-12).

Linear Regression Results

The MODEL Procedure

2SLS Estimation Summary

Data Set Options	
DATA=	SORTTEMPTABLESORTED

Minimization Summary	
Parameters Estimated	15
Method	Gauss
Iterations	1

Final Convergence Criteria	
R	1
PPC	0
RPC(b14)	10834.88
Object	0.999999
Trace(S)	0.024457
Objective Value	7.21E-29

Observations Processed	
Read	687
Solved	687

Linear Regression Results

The MODEL Procedure

Nonlinear 2SLS Summary of Residual Errors							
Equation	DF Model	DF Error	SSE	MSE	Root MSE	R-Square	Adj R-Sq
FSS	15	672	16.4352	0.0245	0.1564	0.7155	0.7096

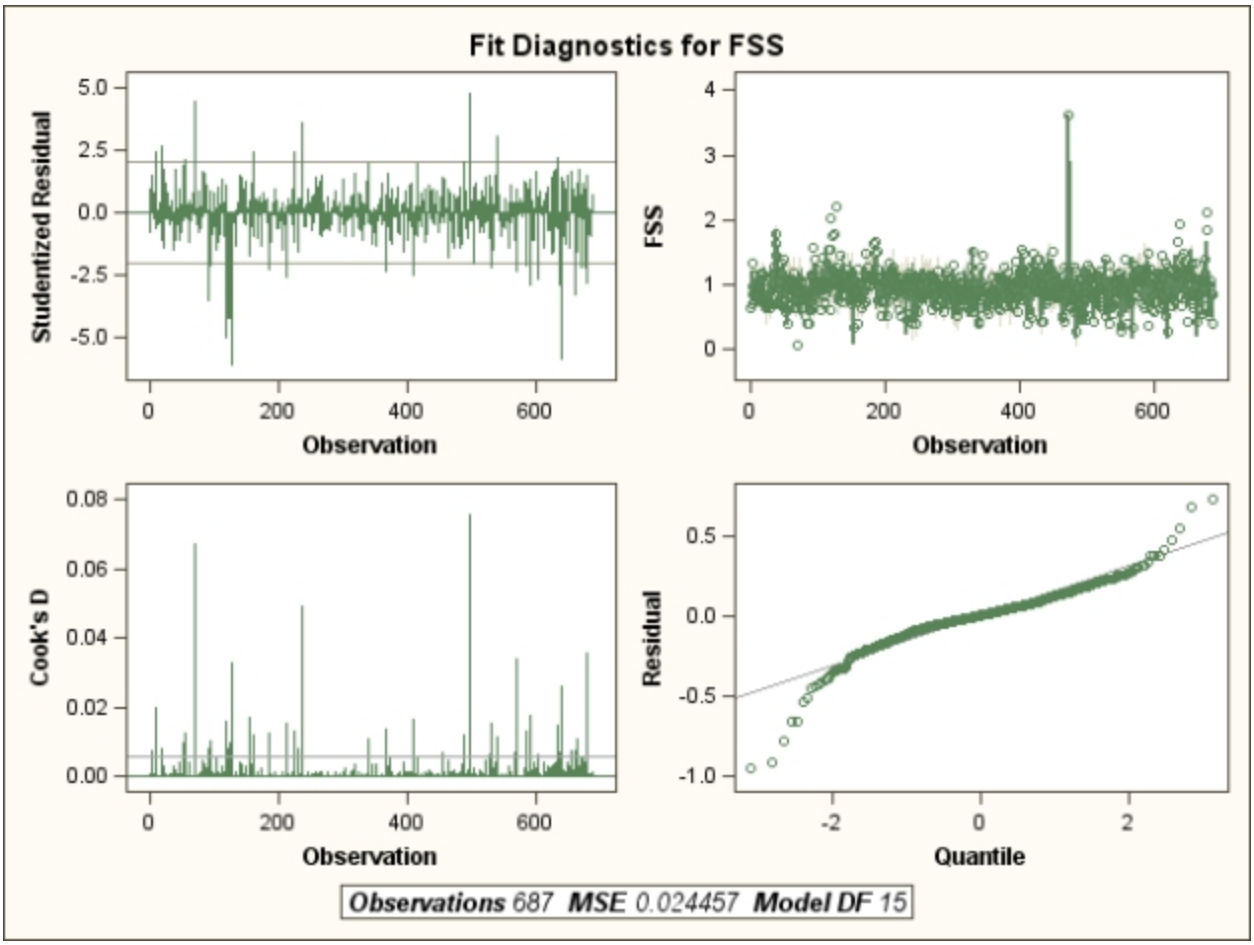
Nonlinear 2SLS Parameter Estimates				
Parameter	Estimate	Approx Std Err	t Value	Approx Pr > |t|
b0	0.524704	0.0381	13.77	<.0001
b1	-0.00734	0.000737	-9.96	<.0001
b2	-0.00322	0.000832	-3.87	0.0001
b3	-0.22819	0.0331	-6.89	<.0001
b4	0.193693	0.0239	8.11	<.0001
b5	0.464173	0.0247	18.76	<.0001
b6	-0.55673	0.0843	-6.60	<.0001
b7	-0.22665	0.0841	-2.69	0.0072
b8	-0.33766	0.0551	-6.13	<.0001
b9	0.715957	0.0551	12.99	<.0001
b10	-0.07229	0.0261	-2.77	0.0058
b11	-0.07161	0.0195	-3.68	0.0003
b12	-0.08858	0.0343	-2.58	0.0100
b13	-0.06189	0.0184	-3.36	0.0008
b14	1.094423	0.1848	5.92	<.0001

Number of Observations		Statistics for System	
Used	687	Objective	7.206E-29
Missing	0	Objective*N	4.95E-26

Heteroscedasticity Test					
Equation	Test	Statistic	DF	Pr > ChiSq	Variables
FSS	White's Test	135.8	95	0.0039	Cross of all vars
	Breusch-Pagan	25.75	14	0.0278	1, Inflation rate, Lending rate, Capital/asset ratio, Deposits to total assets, Operational self sufficiency, Operating expense/ assets, Portfolio at risk > 90 days, Non-earning liquid assets as a %, Yield on gross portfolio (nomina, Africa dummy, Central

Linear Regression Results

The MODEL Procedure



Linear Regression Results

The MODEL Procedure